Volume 39 • JANUARY, 1958 • No. 1

Archives of PHYSICAL MEDICINE *and* REHABILITATION

ORIGINAL ARTICLES

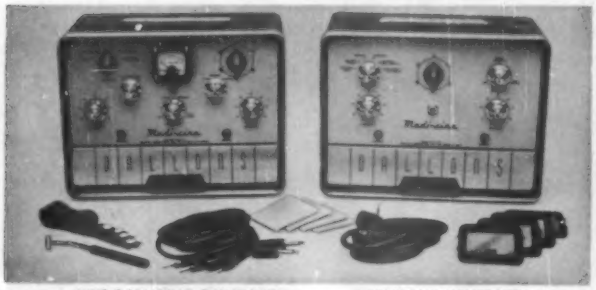
Editor of the Month
FREDERIC J. KOTTKE, M.D.
Minneapolis

ANNUAL SESSION • PHILADELPHIA • AUG. 24-29, 1958

confidence

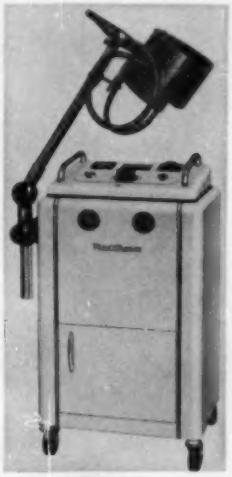
vested in you by patients demands not only the best of personal service but the ultimate in precision equipment of proven merit. Such equipment is labeled

DALLONS



SINE-GALVANIC GENERATOR SINE WAVE GENERATOR

May we suggest, when you consider new equipment that you think first of Dallons — specialists in medical electronics — since 1931.



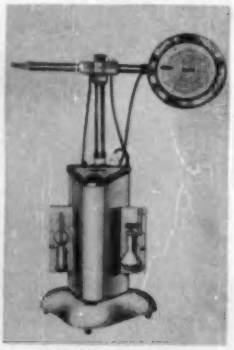
MEDI-THERM

MOBILE MEDI-SONAR

CONSOLE MEDI-SONAR

SPOT QUARTZ

ORIFICIAL QUARTZ



BODY QUARTZ

Write for catalog data sheets of the all-new 1958 FUTURA SERIES — Dallons Equipment for Physical Medicine.

DALLONS

LABORATORIES, INC.

5066 Santa Monica Blvd. • Los Angeles 29, Calif.

ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION

30 North Michigan Avenue, Chicago 2, Illinois

OFFICIAL JOURNAL
AMERICAN CONGRESS OF PHYSICAL MEDICINE AND REHABILITATION
AMERICAN ACADEMY OF PHYSICAL MEDICINE AND REHABILITATION

Original contributions, exchanges and books for review should be forwarded to the Editorial Office. All business matters including advertising should be handled through the Executive Office, 30 N. Michigan Ave., Chicago 2, Illinois. The statements in the manuscripts published in the ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION are made solely on the responsibility of the author. The American Congress of Physical Medicine and Rehabilitation and/or the American Academy of Physical Medicine and Rehabilitation does not assume any responsibility for statements contained therein. Manuscripts accepted for publication in the ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION are for exclusive publication and may not be published elsewhere.

Subscription—In the United States, its possessions, and Mexico, $7.00 yearly; Canada, $8.00; elsewhere, $14.00 the year; $0.75 per single copy; special issues $1.00 per single copy. Advertising rates on application. All advertising copy subject to acceptance by Publication Committee.

Published monthly at Chicago, Illinois, by the American Congress of Physical Medicine and Rehabilitation. Entered as Second Class Matter at the Post Office at Chicago, Illinois.

The ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION is devoted to the publication of significant articles in this particular field. Contributions of interest to those in physical medicine and rehabilitation are invited. Articles are accepted only with the understanding that they are contributed exclusively to the ARCHIVES. Articles and accompanying illustrations become the property of the journal.

MANUSCRIPTS

Submit only the original copy of the article, but retain a copy for use in correcting galley proofs. Carbon copies are not acceptable for editing and typesetting purposes.

REFERENCES

References should be placed at the end of the manuscript and should conform to the style of the Quarterly Cumulative Index Medicus. No more than twenty references should be included with a manuscript.

ILLUSTRATIONS

Only reproducible illustrations will be accepted. All photographs must be black and white glossy prints, clear cut and contrasting. The size of each photograph submitted should be no larger than 5" x 7". Instructions for combining photographs are acceptable. The Editorial Board reserves the right to limit the number and size of illustrations used with any manuscript submitted for publication. Any number of illustrations over three (3) is charged to the author.

REPRINTS

Reprint order blanks with a schedule of prices will be attached to galley proofs. Individual reprints of an article must be obtained direct from the author.

COPYRIGHT

Matter appearing in the ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION is covered by copyright. Permission for reproduction must be directed to the Editorial Board.

Detailed information covering instructions for the preparation of manuscripts for publication may be had by writing direct to the Editorial Office, 30 N. Michigan Ave., Chicago 2.

PRINTED IN U.S.A.

TECHNICAL DIRECTOR —
OCCUPATIONAL THERAPY SCHOOL

If you have organizational and administrative ability and can help us plan and operate a new school of occupational therapy we're interested in you. Experience in teaching, work in a comprehensive rehabilitation setting, and background in industrial arts desired. Challenging work in University setting with good salary, liberal retirement plan, social security. Eight paid holidays, up to sixty days sick leave. Tuition exemption on University night courses after six months. Beautiful city with reasonable rentals and homes. Mild climate with skiing, boating and camping only an hour's drive or less. Write William Cook, Personnel Officer, University Hospital, University of Washington, Seattle 5, Washington.

Physical Medicine and Rehabilitation Residencies Available: General Medical and Surgical Teaching Hospital. 1500 Beds, University Medical Schools Affiliation. 3 years approved residency. Board approved. Non-career residencies annual stipend, $2,840-$4,500; career residencies annual stipend $5,915-$8,990. Appointment to grade and stipend dependent upon qualifications. U. S. Citizenship and graduate of approved medical school required. Inquire: Director, Professional Medical Services, GM&S Hospital, VA Center, Los Angeles 25, California.

PHYSIATRIST

Physiatrist needed to direct Department of Physical Medicine and Rehabilitation in a large general hospital. Department includes a large physical therapy section and a small newly formed occupational therapy section, with four full-time, one part-time Physical Therapists, and one full-time Occupational Therapist. Physician selected becomes a member of the active medical staff. He will be expected to participate in the hospital's teaching program. Financial arrangements are open. For further information, please address inquiries to John C. Mackenzie, M.D., Director, TOURO INFIRMARY, 3516 Prytania St., New Orleans, La.

OPPORTUNITIES AVAILABLE

WANTED: PHYSIATRISTS: (a) To direct rehabilitation program, 550-bed general hospital; child psychiatric program including inpatient section will be established in '58; university city, Midwest. (b) To direct department including rehabilitation service, 500-bed general hospital; city 100,000 near medical center; $15,000-$20,000. OCCUPATIONAL THERAPISTS: (c) Department supervised by well qualified physiatrist and medical director FACP; Southwest. (d) Staff; historic town, near beautiful beach area, Northern California; average temperature 62°; $360, yearly increase. PHYSICAL THERAPISTS: (e) Male to direct department, 18-man group (all Board); Midwest; percentage grossing $8000-$10,000. (f) 200-bed voluntary community general hospital; large number of outpatients who visit hospital through affiliation with national foundation for arthritis and rheumatism; department administers to needs of inpatients particularly orthopedic service; university city, Pacific Northwest.

For further information regarding these opportunities, please write Burneice Larson, Medical Bureau, 900 North Michigan Avenue, Chicago.

GRADUATES OF APPROVED SCHOOLS FOR PHYSICAL THERAPISTS

for

California State Hospitals
Veterans' Home
Schools for Handicapped

Requires registration with
California Medical Board
and U. S. citizenship

Need no experience to start
at $395; raise to $415 after
six months; promotions to $530

State Personnel Board
Box 70 • 801 Capitol Avenue
Sacramento, California

WANTED

Immediate placement for a qualified, registered physical therapist, female, for newly organized Department of Physical Medicine in a 72-bed hospital with a proposed 32-bed addition. Salary commensurate with ability and experience. Automatic periodic salary increases. Many employee benefits including insurance, paid vacations, meals. Write to P. A. De Moon, Adm., Franklin Boulevard Community Hospital, 3240 W. Franklin Blvd., Chicago 24, Ill.

Specialists in Electro Medical Equipment for Physical Therapy, Rehabilitation and Diagnosis

ELCo

FRED LANDAUER CO.
11 BLENHEIM COURT
ROCKVILLE CENTRE, L. I., NEW YORK
Tel. RO 6-4527

IHA

REPRESENTING LEADING MANUFACTURERS

Dependable Repair Service

Liberal Trade-Ins

Consultant Service for planning new departments

We buy and sell Good Used Equipment

IF YOU ARE

. . . . . a clinician
. . . . . a research worker
. . . . . a physiologist
. . . . . a bio-physicist
. . . . . a teacher of physical medicine and rehabilitation

IF YOU WANT

. . . . . to stay abreast with what is new in physical medicine and rehabilitation

YOU MUST

. . . . . read the **Archives of Physical Medicine and Rehabilitation,** the official journal of the American Congress of Physical Medicine and Rehabilitation and the American Academy of Physical Medicine and Rehabilitation

. . . . . no other medical periodical gives you as broad a coverage in the field of physical medicine and rehabilitation . . . each month you will find in this journal informative articles on new developments, theories and practices dealing with all phases of this specialty

YOU ARE INVITED

. . . . . to send in your subscription today. Sample copy will be sent on request. Subscription price $7.00 per year; Canada, $8.00; elsewhere, $14.00 the year. Bill later if you wish. Return the coupon with your instructions.

AMERICAN CONGRESS OF PHYSICAL MEDICINE AND REHABILITATION,
30 No. Michigan Ave., Chicago 2.

Please find enclosed check for $7 ☐ or bill me ☐ for one year's subscription to the ARCHIVES.

Name_____

Address_____

City, Zone and State_____

ST. LUKE'S HOSPITAL DOCTORS

are pleased with RESULTS of

TRACTIONAID *Treatments...*

Mr. K. J. Shoos, superintendent of the Saint Luke's Hospital in Cleveland, says, "We are using our Hausted Tractionaids continuously . . . often treating seven patients a day. This equipment has proved convenient to operate; it may be taken to the patients' beds. Our doctors like the results of the treatments, and the patients tell us traction with Tractionaid is comfortable."

The above statement is typical of the comments made wherever the new Hausted TRACTIONAID is being used clinically.

Because the TRACTIONAID is electronically controlled and hydraulically operated, it offers the ultimate in improved traction therapy. It permits smooth, even, steady or intermittent traction . . . at exactly the pull and time interval prescribed. Traction from 1 to 100 pounds may be pre-set. Extreme flexibility of application makes pelvic or cervical traction simple. Indicated wherever traction or manipulation is desired.

Only Hausted TRACTIONAID automatically compensates for patient's movement during treatment!

Tomorrow's Equipment-Today

FOR COMPLETE DATA AND CLINICAL REPORTS WRITE TO

HAUSTED MANUFACTURING COMPANY

MEDINA, OHIO

PRESTON

A Complete Line

FOR PHYSICAL MEDICINE AND REHABILITATION

Featured Items for January – WRITE FOR ILLUSTRATED LITERATURE.

• "AMBUL-AID" — TRAINING WALKER

The ONE Walker that can be used for every type patient. New Design. Crutches laterally and vertically adjustable by finger-tip control. Wheels have brakes. Each wheel swivels independently or locks in parallel position — giving the walker lateral stability when needed (for performing swing through gait, etc.). Adjustable in height. Substantially constructed — entirely of aluminum. Order by Catalog Numbers:

PC 2340 Ambul-Aid Adult Size complete **$176.50**
PC 2342 Same — less hip strap and abductor rods **$165.50**
Also available in Child Size (at $6.00 below price of Adult Walker)

• THE NX EXERCISE UNIT MODEL 100

. . . was developed for effective administration of progressive resistance exercises to the important knee joint muscle groups. It consists of a table (30x36x30" high), one resistance arm for weights, one exercise arm and an ROM indicator. The angle between the arms is adjustable — therefore *maximum or minimum resistance can be given at any point in the range*, and a variety of resistance patterns can be obtained. This unit may also be used for BK amputees or BK fracture cases. An efficient and time-saving adjunct to any PT program. Used in many leading hospitals and rehabilitation centers. Order by Catalog Numbers:

PC 2251A NK Exercise Unit Standard Model 100 ..... **$179.50**
PC 2251F NK Folding Model 200 with folding table for wall attachment **$179.50**

• THE NEW PRESTON CATALOG 1058

Describes Today's Most Complete Line of Equipment for REHABILITATION, EXERCISE, HYDROTHERAPY and ELECTRO-THERAPY. Also: DIAGNOSTIC APPARATUS, TRACTION DEVICES, CEREBRAL PALSY FURNITURE, WHEELCHAIRS, WALKERS, LIFTERS, CRUTCHES and SELF HELP DEVICES. Write for your free copy today.

Layouts and lists of suggested equipment for new departments are available free of charge.

J. A. PRESTON CORP.

175 FIFTH AVENUE, NEW YORK 10, N. Y.

HANDICAPPED?

His Hanger leg is no handicap!

"I have played on softball teams, was chosen as a member of the All-Star team, play tennis, and enter into any games that I would had I not been wearing an artificial limb," says O. D. Stone, Hanger wearer in Texas. Not all wearers of Hanger Limbs can jump as Mr. Stone does above. But Hanger wearers **can** and **do** walk comfortably, safely, and satisfactorily, and perform everyday activities. Hanger Limbs allow the amputee to return to daily life as a living and working individual.

Hanger PROSTHESES

AVAILABLE AT AUTHORIZED FACILITIES IN THE FOLLOWING CITIES:

Eastern Region:

BALTIMORE 1, MD.
BOSTON 16, MASS.
CHARLESTON 2, W. VA.
CHARLOTTE 2, N. C.
NEW YORK 11, N. Y.
PHILADELPHIA 7, PA.
RALEIGH, N. C.
RICHMOND 19, VA.
ROANOKE 12, VA.
WASHINGTON 13, D. C.
WILKES-BARRE, PA.

Southeastern Region:

ATLANTA 1, GA.
BIRMINGHAM 1, ALA.
COLUMBIA 5, S. C.
JACKSONVILLE, FLA.
KNOXVILLE, TENN.
MIAMI 37, FLA.
MOBILE, ALA.
MONTGOMERY, ALA.
NASHVILLE, TENN.
NEW ORLEANS 19, LA.
ORLANDO, FLA.
SHREVEPORT, LA.
TAMPA 2, FLA.
WEST PALM BEACH, FLA.

Central Region:

COLUMBUS 8, OHIO
PITTSBURGH 30, PA.

Midwestern Region:

CHICAGO 5, ILL.
CINCINNATI 2, OHIO
DALLAS 1, TEXAS
EVANSVILLE, IND.
INDIANAPOLIS 2, IND.
OKLAHOMA CITY 3, OKLA.
PEORIA 4, ILL.
ST. LOUIS 3, MO.
WICHITA, KANS.

Implications of Measured Visuospatial Impairment in a Group of Left Hemiplegic Patients

Mrs. Virginia B. Carroll
Minneapolis

● An analysis of errors on the Minnesota Test for Differential Diagnosis of Aphasia with left hemiplegic patients is presented in contrast with known test patterns of right hemiplegic patients with aphasia. The specific findings with the nondominant hemisphere group reveal a significant homogenous deficit in visuospatial, temporal and numerical relationships as well as a similarity in behavior responses to the observed impairment. The therapy attempted is discussed and the patient response is related to known concepts of learning theory. The implications of the residual deficits are then related to the individual vocational needs of the patient.

While the purpose of this paper is to discuss the language impairment of the left hemiplegic patient, findings are perhaps best understood in contrast to the right hemiplegic, aphasic patient.

Schuell[1] has presented five prognostic groups that have been found stable throughout therapy with aphasic patients. Three of the groups carry a relatively good prognosis. These patients have a primary problem in auditory retention and recall which results in inability to express themselves in speech or writing without obvious difficulty or to retain long material they hear or read. Second, there are those who have, in addition, reading and writing difficulty. Third, there are those who have, in addition to the auditory problem, a sensorimotor deficit manifested in difficulty with coordinated speech movements.

The two groups with a poor prognosis (about 25 percent of the total) are, first, the patients who have poor auditory and reading comprehension, no speech, and no functional writing, but may have reasonably adequate social behavior. The last group is defined as patients with a history of bilateral damage with resulting deficits in any or all areas of language. They also are emotionally labile, irritable, have many somatic complaints, and are incapable of much self-directed activity.

These findings resulted from Schuell's analysis of her test, The Minnesota Test for Differential Diagnosis of Aphasia. The battery is designed to detect errors in the following six functions: (1) auditory, (2) visual, (3) spoken formulation, (4) written formulation, (5) numerical concepts and arithmetic processes, and (6) body imagery. It has been used with 149 patients with dominant hemisphere damage and 42 non-brain-damaged men. There are 70 subtests with 606 scored items. No subtest is included which was not missed by some patient with a dominant hemisphere lesion, while no subtest is included which was failed by the normal group.

Rationale

The test has also been used sporadically with nondominant hemisphere patients, but in such small numbers that an analysis of test patterns has not been previously attempted. Left hemiplegic patients have generally been considered good prospects for therapy from a physical medicine point of view because they had no difficulty comprehending instructions or in expressing their needs. While some people believe it is virtually impossible to place stroke patients vocationally, the picture at least looked brighter for the left hemiplegic because he did not have a concomitant language problem as is usually observed with right hemiplegic patients.

To determine if there was any consistency in language deficits with nondominant hemisphere lesions, every patient who was admitted to Elizabeth Kenny Institute from December, 1956 to July, 1957 with a history of only a single, right hemisphere vascular episode has been given the aphasic battery. Three were also tested at the Minneapolis Veterans Administration Hospital in June, 1957. The total number is 20. The age range is from 37 to 77. The educational

Read at the Thirty-fifth Annual Session of the American Congress of Physical Medicine and Rehabilitation, Los Angeles, September 13, 1957.

Head, Speech Department, Elizabeth Kenny Institute.

range is from fifth grade through college. Every patient had had a cerebrovascular occlusion or hemorrhage. Two had a demonstrable left homonymous hemianopsia.

Test Results

Of the 70 subtests given, a striking homogeniety of failures occurred. Unlike the aphasics for which Schuell isolated five groups, the left hemiplegics manifested only a difference in degree of failure rather than in kind of failure. There were 17 subtests which were failed in part by 65 per cent of the patients. Of these 17 subtests, 11 were failed by 75 per cent, 6 by 85 per cent, 1 by 95 per cent, and 1 by 100 per cent of the patients.

It is of significance that the homogeniety of errors extends even to the items within the subtests. For example, in a subtest containing eight items, only two items were missed at all by any patient and these were the same two items every single time. Also, in any subtest containing several items, almost no patient failed all the items presented.

The critical items on which the patients made errors are as follows:

Auditory Disturbances. In testing for auditory disturbances, out of 13 subtests, two contained significant items. These were in recognizing errors and in answering questions about a factual paragraph.

In recognizing errors, the patient is asked to tell if an item is true or false. The same two items out of eight were consistently failed by 65 per cent of the patients. These were: "Columbus discovered America in 1942," and "If you have a hard time getting up in the morning, you should try going to bed later at night." Both of these items involve the concept of time.

The paragraph was missed in part by 75 per cent of the patients, yet all six questions were not missed by any patient. The most consistent finding was the inability to integrate the story in a logical fashion so that the answers contained obvious contradictions.

Visual Disturbances. In visual and reading disturbances, rarely was a true visual field cut found, but reading rate was impaired in 65 per cent of the patients. Comprehension of single sentence material contained errors by 80 per cent of the patients. Again, errors were not random but were concerned with time or judgment such as, "There are 635 days in the year," or "Does everyone put money in the bank?"

Reading a short news story infrequently presented any problem in comprehension, but a longer story did. The findings again revealed the inability to integrate the material into a logical whole. For example, the story is about a man named Griswold who captured 43 dragon-like creatures in Indonesia in 1934. He brought back four of these to this country. He states they looked like the ancient dinosaurs. One question is, "Did Griswold capture any dinosaurs?" These patients most frequently responded yes. Since the patients frequently read the test questions aloud, it was possible to determine they were not misreading the question.

Spoken Formulation. While reading sentences aloud was missed by only 30 per cent of the patients, it was frequently noted they missed the first word or two on the left side without being aware that the sentence was then only a partial idea. The sentence, "We went to the mountains for our vacation last summer," might be read by an aphasic patient as, "He went to the lake for our vacation last year." These patients read, "to the mountains for our vacation last summer."

The speech of these patients in ordinary conversation was entirely normal. No slurring or articulation problems were noted in any patient. They could explain, describe or define any material presented. However, when presented with similarities or proverbs, they began to fail. When asked to name how two things are alike, 65 per cent of the patients missed at least one out of six items. They were usually unable to make an abstract generalization on one of the items even though they could on others. The most frequently missed item was, "How are east and west alike?" Yet, this item is the last in the series.

When asked to explain the meaning of three proverbs, 70 per cent of the pa-

tients missed at least one, yet only 15 per cent missed all three. For example, when asked to explain, "Don't change horses in the middle of the stream," a typical answer was, "You might drown." It would appear, then, that it is not abstractions, *per se,* which are difficult, but to be able to abstract consistently, particularly if he is required to project himself in explaining time or space concepts.

Written Formulation. In the fourth section of the test, visuomotor and writing disturbances, the patients made serious errors on 4 of the 14 subtests. Drawing a house from memory revealed parts missing, particularly on the left side, or gross distortions in perspective, as, the sidewalk coming out of the side of the house. The patients were also asked to spell words ranging in difficulty from first to eighth grade level. Seventy per cent of the patients misspelled at least one word in writing them down on paper, yet only 45 per cent missed any in spelling them aloud. Therefore, all the misspelling cannot be accounted for on the basis of unfamiliarity with the more difficult words.

In writing sentences to dictation, 90 per cent of the patients made errors. Unlike aphasic patients who fail as sentences become longer because they cannot retain the content long enough to write it down, these patients retained but made errors in letter omissions or reversals. In writing a short paragraph describing a picture, 100 per cent of the patients made more than the allowed three errors in 40 words required in five minutes. This is highly significant because the same picture is used for the patients to describe aloud what is happening and only three patients made any errors.

Numerical Concepts and Arithmetic Processes. This fifth section tests comprehension with money, time, short word problems and problems in addition, subtraction, multiplication, and division. No problem is above fifth grade level. Eighty per cent of the patients missed the subtraction problem, 85 per cent missed the multiplication, and 95 per cent missed the division. The striking thing about these errors is not just a calculation error but the extreme deviancy noted. E.g., the answer to the division problem is 26, yet one answer given was 118,642,411. The patients rarely showed any awareness of the total illogicality of their answers and usually returned the problem as correct.

Body Imagery. The last area of language tested is body imagery. In two subtests, drawing a man and the Wechsler Object Assembly Test, these patients revealed serious impairment. While being asked to draw a man may be a threatening question to most of us, our drawing would not show the gross distortion and omission, particularly on the left side, observed in about 75 per cent of the patients' drawings.

On the Wechsler Object Assembly Test, the patient is asked to put together a figure consisting of a body, head and four extremities. Eighty per cent of the patients failed to do this and usually failed to put the left arm or leg on correctly. On the second part, he is asked to put together six pieces to form a head. Ninety per cent of the patients failed this item, yet it is normally passed by a 9-year-old.

Discussion

If the test errors are viewed as a whole, the factors which emerge are those which involve the ability to manipulate, visualize or recall visually objects as a whole; to comprehend a whole idea; and to integrate parts in a logical time sequence. Such impairment might be generalized as a defect in judgement concerning visual, temporal or spatial concepts. Such skills as comprehending important reading material, writing a comprehensible letter, or calculating sufficiently to pay bills or to keep a checkbook are required of most employed people.

Other observations of this left hemiplegic group which are relevant and which may be observed at times are: The patients are found to get their shoes on the opposite feet; put shorts on over trousers; not get the left arm in a sleeve; button shirts with the second button in the first button hole; bump into furniture on the left; not comb their hair, shave, or brush their teeth on the left side; not

get glasses on over the left ear. They may complain that the food is good but they get no salad, or that the waitress forgets to bring them a fork. In occupational therapy, they have been found to be consistently unable to weave even the most simple pattern and have had to be literally cut out of the maze of yarn they have woven around themselves and the wheelchairs. They frequently do not write or draw on the left side of the page and may use colors inappropriately. In reading, they may skip the left page or left column without showing any awareness of missing any content.

Because the disorientation in time may be fairly subtle, it is important to keep in mind that they may become confused about their schedules and complain unduly about the lack of dependability of the staff. This can create interpersonal problems among the staff unless this is recognized and separated from legitimate complaints.

Therapeutically, the attempt to help these patients is designed as a relearning task. The patient must gain insight into his difficulties by first accepting that he has a problem. Then he must have the ability to discriminate a correct from an incorrect response. Last, he has to be able to generalize what he has attained from one problem to the next. The learning pattern we have observed is entirely different from that seen with most aphasics or normals. These patients make very slight momentary gains which they are unable to maintain from day to day.

Our culture demands a high degree of accuracy in language performance in almost any kind of work or social living. It is not acceptable to be 65 per cent accurate on any job. Further, with these patients, the inconsistency of the errors increases the problem of compensation for the difficulties. In trying to achieve a level of consistent success even in reading directions, writing down messages and telephone numbers, or calculating bills, our results have been singularly discouraging.

At the present time, I believe the greatest contribution we can make to rehabilitation with these patients is family counseling about the areas of difficulty found in testing for functional language. We must spell them out in very specific terms in order that the family does not believe the problem is one in judgment in every area of thinking so that the patient is presumed incompetent. The family must also be cautioned about the inconsistency of the errors so that they do not assume that two accurate responses mean that the third will be correct. Particularly, they must understand that the patient will need someone else to help him in matters requiring visual judgment in financial matters, driving and personal grooming. His vocational plans may have to be drastically revised, but for the protection of himself and his job, as well as for the welfare of his family, he has to be presented with the difficulties observed as a residual of the brain injury. By utilizing other people to read and calculate for him, and to dictate, he may be able to salvage sufficient skills to be productive again.

Summary

The patient with a dominant hemisphere lesion with resultant aphasia carries, about 75 per cent of the time, a relatively good prognosis for return of functional language. His primary problem is reduced auditory retention span and inability to recall language patterns. Even with concomitant visual or sensorimotor problems, his functional recovery is only limited by necessarily longer therapy, for he responds with a typical learning curve. The nondominant hemisphere patient appears from this study to have a homogenous set of problems concerned with a deficit in judgment about visuomotor, temporal, and spatial concepts which do not respond to any known therapy because these patients appear unable to generalize in relearning. Therefore, from a vocational point of view, these less obvious problems of the left hemiplegic patient may actually present greater placement problems in the long run than they do for the aphasic patient with a good prognosis.

Reference

1. Schuell, H.: Diagnosis and Prognosis in Aphasia. A.M.A. Arch. Neurol. & Psychiat. 74:3 (Sept.) 1955.

Comparative Study of the Effects of Tenotomy and of Denervation

Charles H. Flint, M.D.
Khalil G. Wakim, M.D.
and
Frank H. Krusen, M.D.
Rochester, Minn.

● In a large group of adult albino rats a comparative study at intervals up to 120 days was made of the work output, endurance, weight, and histologic structure of the muscles of the tendo achillis and the tibialis anterior in the lower extremities after tenotomy of the tendo achillis, excision of the tibial nerve alone, or complete denervation by high excision of the sciatic and femoral nerves. Excision of the tendo achillis led to gradual reduction of work output and endurance of the gastrocnemius-soleus-plantaris muscle group up to 30 days, after which there was a progressive return toward normal function. Careful dissection of the muscles at the time of return to normal function revealed complete reattachment of the excised tendon to bony eminences in the area. Tibial denervation gave unsatisfactory results. The findings were inconsistent. Complete denervation by excision of both sciatic and femoral nerves high up in the thigh was associated with consistent progressive deterioration of function, resulting in marked reduction of work output and endurance of the muscles and a histologic picture of complete denervation with marked decrease of muscle weight. The work output was practically nil toward the end of the observation period (120 days) in the muscles whose nerve supply was abolished by high excision of the sciatic and femoral nerves.

A review of the literature dealing with the effects of tenotomy and of denervation on skeletal muscle in animals yields insufficient information regarding changes in weight and work output; therefore, we undertook this study of three large groups of adult male albino rats. The groups were nearly equal in number.

Tenotomy and denervation were performed with the animals under ether anesthesia. In each rat of the first group, tenotomy was performed on one hind leg; it consisted of complete separation of the tendo achillis from the os calcis. To avoid early reinsertion, the severed tendon was either stitched to the overlying skin, or turned under and stitched to the gastrocnemius-soleus muscle, or turned on itself and tied double with black silk. The rats in the second group had one hind leg partially denervated by removal of a section of only the tibial nerve just distal to the separation of the sciatic nerve into its tibial and common peroneal divisions. Denervation of one hind leg of each rat in the third group was accomplished by excision of a long segment of the femoral nerve in the groin and a long segment of the sciatic nerve at the level of the greater trochanter. These rats constituted the completely denervated group.

At specified intervals from 7 to 120 days after the operation, the tenotomized and denervated animals were used for determination of work output, endurance of the muscles of the Achilles tendon, and weight of the individual muscles.

The operation preliminary to the testing of the capacity of the muscles for work and the testing itself were performed with the animals under pentobarbital anesthesia; 25 mg. per kilogram of body weight was given intraperitoneally. The Achilles tendon was excised from its insertion. From the freely hanging tendon a 100-gm. weight was suspended by a wire which, midway of its length, passed around a tallying pulley as described by Wakim and Krusen.[1] The muscles were test-stimulated by means of a current introduced once every 3 seconds for 1 or 2 hours, during which time the work output was recorded every 100 seconds. Every tally unit represents a 4-cm. lift of the weight. Therefore, every unit registered represents 400 gm.-cm. of work done by the activated groups of muscles. About 200 observations were obtained on work output from each animal. After that the animals were killed and the muscles of the Achilles tendon were carefully isolated, weighed, and compared with those of the contralateral normal limb.

Read at the Thirty-fifth Annual Session of the American Congress of Physical Medicine and Rehabilitation, Los Angeles, September 13, 1957.

Fellow in Physical Medicine and Rehabilitation, Mayo Foundation.

Section of Physiology, Mayo Clinic and Mayo Foundation.

Section of Physical Medicine and Rehabilitation, Mayo Clinic and Mayo Foundation.

The Mayo Foundation, Rochester, Minn., is a part of the Graduate School of the University of Minnesota.

This study was aided by a training grant provided by the Office of Vocational Rehabilitation, Department of Health, Education and Welfare.

Findings

Effects of Tenotomy. The effects of tenotomy on work output and on muscle weight are shown in table 1 and figure 1. Under the same conditions the weight and work output of the tenotomized muscles were compared with those of the contralateral intact muscles (their controls). By the end of 7 days the average work output of the tenotomized muscles had declined 12 per cent, that is, from a normal of 136 to 120.1 gm.-meters per 100 seconds, although as yet loss of weight was not detectable. At the end of 15 days the work output had declined 41.2 per cent, whereas weight had decreased only 23 per cent from that of the control muscles. At the end of 30 days the work output had declined 43.1 per cent and loss of weight had reached 30 per cent. Forty-five days after tenotomy the work output had risen to 85 per cent of normal, although weight was still 28 per cent less than that of the normal muscle. The muscle on the tenotomized side failed to catch up in weight with the normal side during the period of the study. From this it is evident that work output reflects the capacity of the muscle more accurately than the weight of the muscle does.

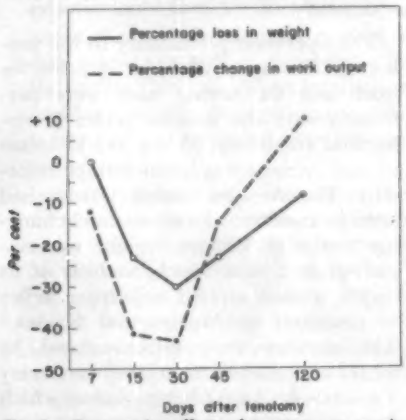


Fig. 1 — Comparative effects of tenotomy on muscle weight and work output.

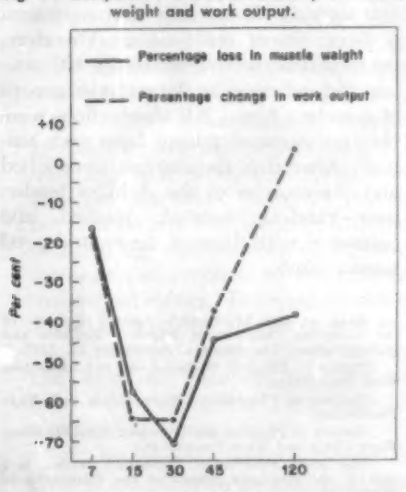


Fig. 2 — Comparative effects of partial denervation on muscle weight and work output.

Effects of Tibial Denervation. Tibial denervation gave results (table 2 and fig. 2) rather closely paralleling the findings after tenotomy, although the initial drop, as shown in figure 2, in weight and work output exceeded by more than 20 per cent the findings after tenotomy at the same period (seventh to fifteenth days). On the seventh day after section of the tibial nerve, the loss was 18.5 per cent for work output and 16.3 per cent for muscle weight. By the fifteenth day the drop in each had progressed to 64.6 per cent and 57.4 per cent, respectively. Work output leveled off then, as shown in figure 2, although the value at 30 days was the lowest value obtained, namely 64.7 per cent of the normal. Muscle weight, however, continued to lose another 13.3 percentage points from the fifteenth to the thirtieth day when it was 70.7 per cent of normal. From this time on, the partially denervated muscle began to regain its power and the percentage of weight lost also became smaller. At the end of the observation period the work output was greater than that of the normal muscle and the weight was still 38.6 per cent less than that of the normal muscle. Initially the percentage loss of weight was not as great as that of work output. In this group, then, the muscle weight not only declined more and for a longer time than the capacity for work, but also it failed to recover at a comparable rate or to a comparable extent.

Effects of Complete Denervation. Complete denervation by excision of both femoral and sciatic nerves resulted in severe and progressive loss in both weight and work output of the involved muscles.

Table 1: Effect of Tenotomy

Days after Tenotomy	Work Output, Gm.-Meters	Percentage Change in Muscle		Animals
		Work Output	Weight	
7	120.1	−12.0	0	15
15	79.9	−41.2	−23.0	8
30	77.4	−43.1	−30.0	7
45	116.3	−15.0	−28.0	4
120	149.3	+10.0	− 8.7	12

Table 2: Effects of Tibial Denervation

Days after Section of Tibial Nerve	Work Output, Gm.-Meters	Percentage Change in Muscle		Animals
		Work Output	Weight	
7	110.9	−18.5	−16.3	6
15	48	−64.6	−57.4	4
30	48.2	−64.7	−70.7	8
45	106.5	−37.6	−44.5	7
120	139.6	+ 2.5	−38.6	9

Table 3: Effects of Complete Denervation

Days after Complete Denervation	Work Output, Gm.-Meters	Percentage Decline in Muscle		Animals
		Work Output	Weight	
7	108.8	20.0	13.2	16
15	50.8	62.6	46.9	7
30	21.4	84.3	73.4	5
45	27.5	79.0	62.3	9
120	0	100.0	84.7	10

The steady progression of loss in work output and the steady decline in muscle weight are shown in table 3 and figure 3. At 120 days after denervation, muscle weight had fallen 84.7 per cent (the total losable weight of a muscle) and the work output had dropped 100 per cent. A third curve giving the actual average loss of weight in grams has been added to figure 3 to show that, although the curves for loss of weight and work output show a discontinuity at 45 days, the actual loss of weight in grams was a continuous and unremitting process.

Comment

Following tenotomy, reduction in capacity for work became apparent as early as the seventh day and reached a low of 43.1 per cent by the thirtieth day. Evidently reattachment of the tendon progressed so rapidly thereafter that the muscle was completely functional by the forty-fifth day and had regained practically full strength by the sixtieth day.

Knowlton and Hines[2] published figures showing a loss of weight in the first 7 days after tenotomy, and suggested that figures obtained after 2 weeks were of no value because of reattachment of the tendon by that time. They also stated that the tendon was functional by the end of the third week and completely

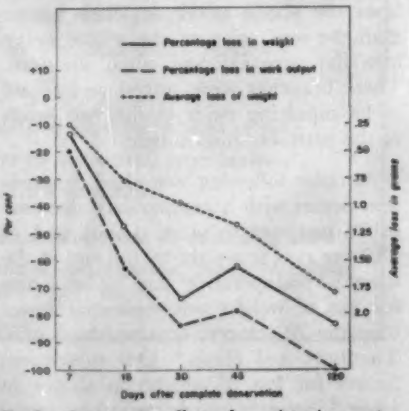


Fig. 3 — Comparative effects of complete denervation on muscle weight and work output.

healed by the end of 6 weeks. These findings agree with ours except that we found no comparative loss of weight during the first week. We also found that losses in both weight and work output progressed up to the thirtieth day.

Another point brought out by our figures concerning the effect of tenotomy is the lag in time of the initial loss of weight behind the initial loss in work output by as much as 7 to 15 days. Also, restoration of strength to normal occurred within the period of study, whereas the weight did not reach normal.

The results following tibial denervation are in accord with the findings of Tower,[3] who noted the necessity of repeatedly denervating the interosseous muscles of the cat in order to achieve complete and lasting denervation. Our method of tibial denervation was similar to our method of complete denervation, namely the removal of a long section of the nerve. In many cases the muscles remained denervated with a loss of weight comparable to that experienced after sciatic denervation; in others, the muscle regained strength and partially regained weight. Hence we concluded that section of the tibial nerve produced inconsistent and unsatisfactory denervation, and that excision of the tibial nerve did not always effect complete denervation. Evidence as to why denervation was incomplete became apparent on examination of some specimens which revealed the presence of small nerves branching from the sciatic nerve at levels higher than the separation of the sciatic nerve into the peroneal and tibial divisions. These branches were traced and found to be supplying twigs to the two heads of the gastrocnemius muscle.

Atrophy following complete denervation began with a comparative decrease of 20 per cent in work output and of 13.2 per cent in weight by the end of the seventh postoperative day. The figure for loss of weight was somewhat lower than the 22 per cent obtained by Sutfin, Thomson, and Hines.[4] Our subsequent figures for loss of weight, as shown in table 3, were in nearly complete agreement with theirs, which were 49.1 per cent at 15 days, 73.2 per cent at 30 days, and 85.5 per cent at 120 days. These authors identified two component parts of muscle: (1) contractile tissue known as the "muscle phase," and (2) supporting and sustaining noncontractile elements called the "nonmuscle phase." Approximation of the amounts of the two parts is possible from analysis of the tissue for chloride and water. They declared that as a result of such analysis the percentage of fresh weight represented by the muscle phase in normal muscle averaged 85.5 per cent for the gastrocnemius of the rat, the muscle used in our studies. Our own figure, which represents the differences in weights between the normal control side and the side which underwent atrophy resulting from denervation, was 84.7 per cent. Hastings and Eichelberger[5] observed that normal fat-free skeletal muscle of dogs consists of an extracellular, or supporting, phase amounting to a maximum of 17 per cent and an intracellular, or contractile, phase of 83 per cent. The difference between their figures and those of Knowlton and Hines[6] may be a species characteristic, the latter authors having established a characteristic for each of different species which seemed to be related to the rate of growth and life span of the species.

Work output declined steadily to a zero figure at the time when maximal losable weight of the muscle was reached. Evidently at that stage the muscle did not contract on electric stimulation and therefore no work was done.

References

1. Wakim, K. G., and Krusen, F. H.: The Influence of Electrical Stimulation on the Work Output and Endurance of Denervated Muscle. Arch. Phys. Med. 36:370 (June) 1955.
2. Knowlton, G. C., and Hines, H. M.: Effects of Growth and Atrophy upon Strength of Skeletal Muscle. Am. J. Physiol. 128:521 (Feb.) 1940.
3. Tower, S. S.: Reaction of Muscle to Denervation. Physiol. Rev. 19:1 (Jan.) 1939.
4. Sutfin, D. C.; Thomson, J. D., and Hines, H. M.: Kinetics of Denervation Atrophy in Skeletal Muscle of the Rat. Am. J. Physiol. 178:535 (Sept.) 1954.

5. Hastings, A. B., and Eichelberger, L.: Exchange of Salt and Water between Muscle and Blood: The Effect of an Increase in Total Body Water Produced by the Intravenous Injection of Isotonic Salt Solutions. J. Biol. Chem. 117:73 (Jan.) 1937.

6. Knowlton, G. C., and Hines, H. M.: Kinetics of Muscle Atrophy in Different Species. Proc. Soc. Exper. Biol. & Med. 35:394 (Dec.) 1936.

Occurrence of So-Called "Myotonic Discharges" in Electromyography

Joseph Goodgold, M.D.
New York City
and
Kenneth C. Archibald, M.D.
Cleveland

● The occurrence of chains of high frequency oscillating electrical potentials combined with a characteristic "dive bomber" audio output is most usually associated with the classical myotonias (myotonia congenita and myotonia dystrophica). It appears rather that such characteristic potentials are most likely a manifestation of increased muscle irritability and are also seen in a variety of conditions including progressive muscular dystrophy, progressive muscular atrophy, and in various peripheral neuropathies. This study presents an analysis of the cases studied in the electrodiagnostic laboratory at the Institute of Physical Medicine and Rehabilitation in New York City along with a review of the literature and a discussion of etiological background of "myotonic" discharges.

The occurrence of chains of oscillating electrical potentials of high frequency associated with a characteristic "dive bomber" audio output represents one of the most fascinating and puzzling phenomen encountered in electromyographic study. The incidence of these waves in the essential myotonias (myotonia congenita and myotonia atrophica) is well established, yet their presence is not pathognomonic since a similar type of potential pattern, with its concomitant sound, may be detected in a variety of clinical entities. It is the design of this report to present various disorders of neuromuscular function in which "electromyographic myotonia" may be encountered. The latter term is used advisedly to distinguish the laboratory finding from the disease categories in which clinical myotonia is evident.

The clinical myotonias are relatively few in number and may in fact represent varieties of myotonia congenita or atrophica. A simple working classification may be presented as follows:

1. Myotonia congenita.
2. Myotonia atrophica.
3. Paramyotonia.
4. Myotonia paradoxa.

Paramyotonia is a term designating a group of disorders in which myotonia appears only on exposure to cold. The validity of this group as a distinct entity is open to conjecture because of the tendency for patients with both the congenital and atrophic varieties of the disease to manifest greater rigidity upon exposure to cool environmental temperatures.

Myotonia paradoxa includes a group of disorders in which there is no myotonia upon initiation of contraction, as with the typical patient, but rather tonicity becomes more prominent with continued activity. While this clinical picture has been described by earlier observers as existing in one group of muscles, while typical myotonia exists in another group in the same individual, a case of pure myotonia paradoxa was reported by Marshall in 1952.

There are some chemical substances such as veratrin and 2, 4 dichlorophenoxyethyl sulfate which delay muscle relaxation and cause continued repetitive excitation of muscle fibers. The myotonic state observed under these circumstances is a pure pharmacodynamic effect.

An enumeration of the patients with positive findings studied in the current report are presented in table 1. It may be noted that a total of 59 patients manifesting "electromyographic myotonia" were encountered. The various diagnoses included in the total are enumerated, with the preponderance falling under the genders of progressive muscular dystrophy and amyotonia congenita.

Report of a Study

A total of 36 children with a diagnosis of progressive muscular dystrophy was examined. All of these clinically manifested pseudohypertrophic changes. Although electromyographic myotonia was

Read at the Thirty-fifth Annual Session of the American Congress of Physical Medicine and Rehabilitation, Los Angeles, September 11, 1957.

Director, Electrodiagnostic Division, Institute of Physical Medicine and Rehabilitation.
Formerly Fellow, Department of Physical Medicine and Rehabilitation, New York University-Bellevue Medical Center, New York City; now, Senior Instructor in Physical Medicine and Rehabilitation, Western Reserve University School of Medicine.

This study was aided by a grant from the Allen P. and Josephine B. Green Foundation.

elicited in 72 per cent or 26 of the subjects, it is felt that the proportion of positive cases is somewhat lower than truly exists since in the patients examined later in the series, careful exploration of the hypertrophic muscle invariably resulted in locating regions in which myotonic bursts were evident.

There are several distinguishing features concerning the type of potentials studied. In no instance were these trains of electrical waves associated with voluntary motion but rather they represented an abnormal discharge evoked by insertion or movement of the needle electrode. In the great preponderance of cases, the electrical pattern was of extremely low amplitude and required astute searching throughout the muscle for areas of hypersensitivity. In most instances a waxing and waning sound similar to, but less distinctive than, the typical dive bomber emission was more readily discerned than was visualization of the electrical patterns on the cathode ray screen. Figure 1 is fairly typical of the visual pattern obtained, showing small amplitude waves which are not particularly impressing, but which are associated with a characteristic sound emission. In the remainder of the cases, wave forms were of moderate amplitude and high frequency. These showed variation both in size and frequency (Fig. 2). The train of potentials, representing single fiber discharge, typically seen during and after the contraction in true myotonia, were conspicuously infrequent in this study. Instead, the abnormal insertion potentials were frequently of long duration, ranging from 6 to 12 milliseconds.

Figure 3 represents such a discharge of 9 milliseconds' duration. An occasional case showed an isolated high frequency burst of total duration of approximately 15 milliseconds. The accompanying sound resembled a buzz rather than dive bombing. It appears that the characteristics of the sound of all the myotonias are a function of variance in both wave size and repetitive rate of moderate to long potential trains.

If to those disease entities enumerated in table 1 we add poliomyelitis, fatigued normal muscle, and muscle cramps, the tabulation would represent a composite of the present study and the cases previously reviewed in the literature. Of particular interest is a study of Walton in 1952 using spectrometric histogram analysis of myopathies. This author's findings closely parallel those of the present study and note that in other than the clinical myotonias the electrical findings were less dramatic and less easily obtained and that the sound decreased in pitch much more slowly. Walton made an interesting observation that there was a typical phenomenon of fall out of vertical histographic lines corresponding to the higher frequencies as the sound in the loud speaker waned.

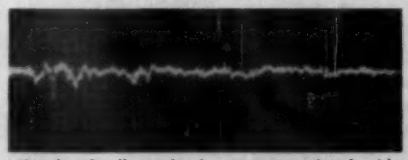


Fig. 1 — Small amplitude waves associated with characteristic short, dive bomber sound emission.

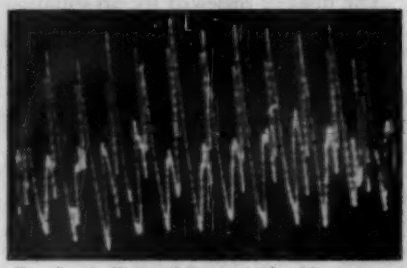


Fig. 2 — A "myotonic" potential with average duration of 9 milliseconds.

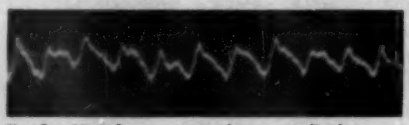


Fig. 3 — High frequency, moderate amplitude waves most frequently associated with myotoniclike bursts incident to needle insertion or displacement.

Table 1: Positive Cases
(Those Revealing Myotonic Potentials)

Progressive muscular dystrophy	26
Amyotonia congenita	14
Marie-Charcot-Toothe disease	1
Peripheral nerve lesions	11
Progressive spinal atrophy	2
Dermatomyositis	2
Arthrogryposis	3

Discussion

Since the original description of congenital myotonia by Julius Thomsen in 1876, many cases have been reported in the literature. A review of the previous studies yields conflicting evidence and opinions in regard to the basic pathophysiological mechanisms involved in myotonia. Briefly considered, these views may be enumerated as follows:

1. Myotonia represents a defect in neuromuscular conduction.
2. Myotonia is a peripheral defect plus a central reflex disorder manifest by afterspasm.
3. Myotonia is due to a central disorder with a hypersensitive muscle acting as a sensory organ.
4. Myotonia is a peripheral defect of the muscle fibers themselves without reference to a special endplate or reflex abnormality.
5. Myotonia is an abnormality involving both the endplate region and the muscle fiber.

The diseases reviewed for presentation in this paper include a great diversity in disorders of nervous and muscle tissues. A common denominator for explanation of electromyographic patterns is difficult to establish but it appears most reasonable that our findings best support the postulations of Denny-Brown and Nevin, and Landau that the tonic response represents a hyperirritability residing in the muscle fibers themselves. Such a viewpoint makes no reference to special endplate or reflex abnormality and would not conflict with the known alterations of function and pathohistological changes seen in poliomyelitis on the one hand and dermatomyositis or arthrogryposis on the other.

Conclusion

A review of the electromyographic occurrence of so-called "myotonic discharges" shows a great diversity of disorders demonstrating this electrical finding, and emphasizes the fact that these potentials are not pathognomonic of clinical myotonia.

References

1. Lambert, E. H.; Millikan, C. H.; and Eaton, L. M.: Stage of Neuromuscular Paralysis in Myotonia. Am. J. Physiol. 171:741 (Dec.) 1952.
2. Walton, J. N.: Electromyogram in Myopathy: Analysis with Audio-Frequency Spectrometer. J. Neurol. Neurosurg. & Psychiat. 15:219 (Nov.) 1952.
3. Doyle, B. J.: Clinical Application of Electromyography. Arch. Phys. Med. 37:748 (Dec.) 1956.
4. Shea, P. A.; Woods, W. W., and Tratar, A. A.: The Myotonias; An Electromyographic Study, with Special Reference to Myotonia Acquisita. A.M.A. Arch. Neurol. & Psychiat. 68:794 (Dec.) 1952.
5. Landau, W. M.: Essential Mechanism in Myotonia: Electromyographic Study. Neurology 2:369 (Sept.-Oct.) 1952.
6. Russell, W. R., and Stedman, E.: Observations on Myotonia. Lancet 2:742 (Sept. 26) 1936.
7. Denny-Brown, D., and Nevin, S.: The Phenomenon of Myotonia. Brain 64:1 (Mar.) 1941.
8. Marshall, J.: Observations on a Case of Myotonia Paradoxa. J. Neurol. Neurosurg. & Psychiat. 15:206 (Aug.) 1952.
9. Brown, G. L., and Harvey, A. M.: Congenital Myotonia in the Goat. Brain 62:341 (Dec.) 1939.
10. Maas, O., and Paterson, A. S.: Myotonia Congenita, Dystrophia Myotonica and Paramyotonia: Reaffirmation of Their Identity. Brain 73:318 (Sept.) 1950.
11. Thomasen, E.: Myotonia: Thomsen's Disease (Myotonia Congenita), Paramyotonia, and Dystrophia Myotonica. Aarhus: Universitetsforlaget i Aarhus, Copenhagen, Denmark, 1948, pp. 1-251.
12. Kugelberg, E.: Electromyography in Muscular Dystrophies: Differentiation between Dystrophies and Chronic Lower Motor Neurone Lesions. J. Neurol. Neurosurg. & Psychiat. 12:129 (May) 1949.

Stair Climbing as Exercise

Gerald G. Hirschberg, M.D.
San Leandro, Calif.

● In rehabilitation, stair climbing is generally considered an activity of daily living which must be mastered. Stairs in the physical therapy department are used as "training stairs." This paper emphasizes the use of stair climbing as an exercise for weak lower extremities. Its advantages over manual resistance, pulley or boot exercises for strengthening are numerous: simultaneous exercise of several muscle groups, facilitation because of primitive pattern, economy of self exercise and group exercise. For coordination, stair climbing is simpler and more effective than Frenkel exercises and "gait training" because step width and height offer a two dimensional guide to the foot. Finally, stairs are readily available in hospitals and in most homes. Indications for stair climbing, prerequisites and technics are discussed.

Steps of various types are widely used in physical medicine and rehabilitation in the elevation training of disabled persons. The essential purpose of elevation training is to enable the patient to negotiate a flight of stairs whenever his daily activities require him to do so.

The purpose of this paper is to show that stair climbing may also be used to advantage as an exercise modality in a great number of disabilities. The purpose of stair climbing as exercise is not perfection of stair climbing ability, but increase of strength and coordination of the lower extremities, improvement of gait pattern, and development of endurance.

The use of stair climbing as an exercise has a number of advantages:

1. The equipment, if regular stairs are used, is usually available in the home or the hospital. If not, special exercise stairs with three or four steps can be easily constructed at little cost.
2. The methods and technics of stair climbing are simple. After initial training, the patient may be supervised by nonprofessional personnel. Later, the exercise can be pursued entirely without supervision.
3. Stairs can be used for group therapy in a hospital setting. One therapist can then handle several patients in stair climbing exercises.

Exercise Value of Stair Climbing

Stair Climbing as a Progressive Resistance Exercise: Stair climbing requires considerable muscular effort. This is quite evident to the average person who, for this reason, often prefers to use an elevator. It is well recognized by the physician who cautions his cardiac patients to avoid, above all, climbing up a few steps. Metabolic studies have shown that 15 times as much energy is required in stair climbing as in level walking.[1]

Since stair climbing requires muscular effort, it constitutes a strengthening exercise. Stair climbing may involve all the muscles of the body, but has a more specific strengthening effect on the flexors and extensors of the trunk and the lower extremities. The exercise of the extensor muscles during stair climbing is considerably greater than that of the flexor muscles. This is desirable since in the normal activities of ambulation and elevation greater strength is needed in the extensor group.

The flexor muscles are exercised while the foot is lifted to the next step. The three flexor groups needed for this phase of stair climbing are the dorsiflexors of the foot, the hip flexors, and the abdominals. The resistance to their contraction is furnished by the weight of the portion of the lower extremity located distally to the contracting flexor. Knee flexors are not used in this phase since gravity causes knee flexion when the hip is flexed in the standing position. All knee flexors are two-joint muscles and will be strengthened during the extensor phase.

The extensor muscles contract while the body is lifted to the level of the step. These are essentially the calf muscles, the hamstrings, the quadriceps, the glutei, and the paravertebral muscles. These muscles have to lift the weight of the segment of the body located above them which includes the major part of the

Read at the Thirty-fourth Annual Session of the American Congress of Physical Medicine and Rehabilitation, Atlantic City, N. J., September 14, 1956.

From the Poliomyelitis Respiratory and Rehabilitation Center, Fairmont Hospital of Alameda County, San Leandro, and the Department of Medicine, Stanford University School of Medicine, San Francisco.

The Poliomyelitis Respiratory and Rehabilitation Center is aided by an annual grant from the National Foundation for Infantile Paralysis, Inc.

body and is, of course, a considerably greater resistance than that to which the flexor group is subjected.

It is generally assumed that level walking also is a form of strengthening exercise and may be used as such, particularly for weaker patients. This assumption is incorrect. Level walking does not necessarily require muscular contraction against resistance. This is best demonstrated by the fact that some patients with a complete flaccid paraplegia are able to walk by locking knees and hips. These patients, however, are frequently unable to climb even a one-inch step. Electromyographic studies have shown that normal individuals use only a minimal amount of available musculature in level walking, while climbing a step increases many times the number of motor units involved in this exercise (fig. 1).

Stair climbing has several advantages as compared to standard progressive resistive exercises with exercise boot or pulleys:

1. It is timesaving because it exercises simultaneously muscle groups in the lower extremities which by the other methods can be exercised only separately.
2. The simultaneous contraction of the various muscle groups causes facilitation which makes the exercise more effective.
3. Further facilitation results from the alternating flexion and extension pattern of a lower extremity which constitutes a natural pattern in which the voluntary action is enhanced by primitive reflex patterns.

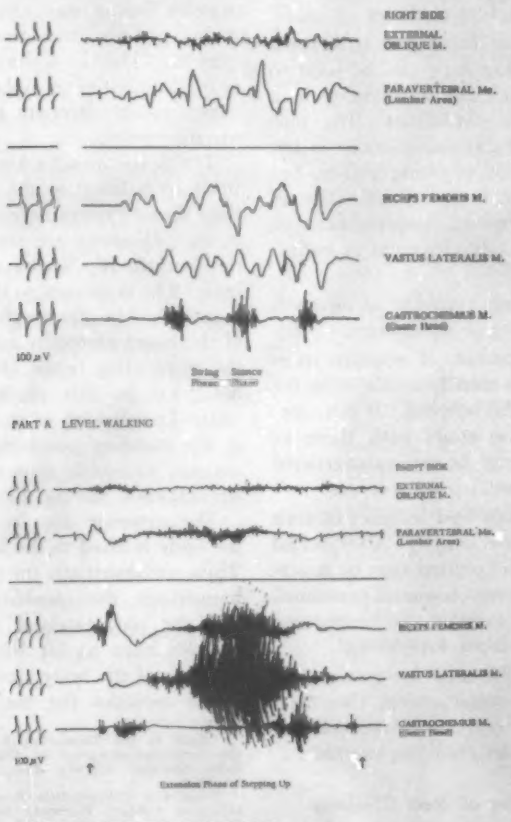


Fig. 1 — Electromyographic recording of action potentials of extensor muscles during *A*, level walking and *B*, stepping up. (Irregular slow deflections in (A) are artefacts due to skin displacement.)

4. The patient who meets the conditions for stair climbing exercises is strong enough to require large weights for standard progressive resistance exercises with boot or pulleys. These large weights are difficult to manage and may even cause injury to the patient or therapist during progressive resistance exercises.

Stair Climbing as a Coordination Exercise: Exercises used in the treatment of ataxia or incoordination were devised originally by Frenkel for tabetics. These were based upon the principle of substituting sight for proprioceptive sensation. The patient is requested to look at his feet and at the spot on which he intends to place them and thus develops a feedback mechanism through the visual pathway which leads to improvement of coordination. Exercise stairs lend themselves readily to this type of exercise. They also have the following advantages over traditional Frenkel exercises.

1. They offer landmarks in three dimensions instead of only two.
2. In addition to sight, the patient can make use of touch by feeling with his toes for the height and for the width of the step.
3. By knocking with his toes gently against the step, the patient may also use hearing as an aid. These latter two mechanisms are particularly valuable in coordination exercises for patients with impaired vision.

In the past four years, two tabetics, two patients with posterior column disease, and four patients with pseudotabetic neuropathy were treated by this method at the Fairmont rehabilitation service. All of these patients showed considerable improvement in coordination after stair climbing was instituted.

Stair Climbing as a Gait Training Exercise: The basic requirements for a proper gait are adequate strength in the muscle groups involved in walking and proper coordination of the function of these muscle groups. Since stair climbing exercises improve strength as well as coordination they are ideally suited for the early phase of the gait training program. In gait training on the level, it is necessary for the therapist to remind the patient to place his legs properly to keep his pelvis forward, to take steps of equal length, to lift the foot, not to lock his knees, and so forth. During stair climbing exercises, it is only necessary to make sure that the patient does not pull on the bannister. When this is avoided, the patient must use a proper position of his trunk and lower extremities in order to be able to elevate himself from one step to the next. He cannot get up unless his knee is first flexed and then extended forcefully. He must lift his leg and he has to take steps of nearly identical length because of the pattern of the staircase. In other words, he is forced to use the gait pattern and posture which is desirable for a good gait. This again is in sharp contrast to level walking, where an individual may propel himself by a variety of entirely improper and harmful gait patterns.

In addition to strengthening and improvement of coordination, these additional factors contribute to making stair climbing exercises the ideal gait training method:

1. It is considerably safer for the patient than level walking because, in case of a tendency to fall, the patient can let himself down gently on one of the higher steps in front of him by holding the bannister with one hand. His fall is lessened by the diminished height of the steps in front of him and the hold he has on the bannister.
2. There is less fear of falling than in level walking, because the patient does not look down the long distance to the ground but only to the steps at his own level in front of him.
3. The understanding of the technic requires little mental capacity on the part of the patient. This is particularly advantageous for patients who are unable to understand the instructions of the therapist because of hearing difficulty, aphasia, or mental disturbances. For some of these patients, stair climbing is almost the only feasible means to train them in a satisfactory gait pattern.

Stair Climbing as a Graded Exercise: Gradation of exercises for cardiac and respiratory patients is rather difficult. Progressive activity is frequently prescribed by habits and routine. At first patients are allowed to dangle, then to sit in a chair, then walk a few steps. This is followed by bathroom privileges, and so on. The closer one comes to the tolerance limit of the patient the more difficult it becomes to prescribe increments of activity which will further increase his exercise tolerance. Increased work through occupational therapy or programs of gradually more strenuous calisthenics have been used.

Stair climbing is a simple and easily standardized means of a graded exercise, and is usually applicable, even though it may be somewhat monotonous. The fact that a step-up test is used as an accepted clinical method of study of cardiac function indicates that climbing up steps is an activity which can be standardized and duplicated. The variables to be considered in this exercise are the patient's weight, the height of the steps, the speed of stair climbing expressed in number of steps per minute, and the total exercise time.

Indications for Stair Climbing Exercises

Hemiplegics constitute the largest group of patients who can benefit from stair climbing exercises. Because most hemiplegics are elderly and may have associated organic mental syndromes, stair climbing is often the only exercise that the patient can be induced to perform.

Stair climbing may be used to advantage in poliomyelitis, Guillain-Barré syndrome, peripheral neuropathies, and peripheral nerve injuries. Following cerebellar and posterior column disease, such as tabes and posterolateral sclerosis, stair climbing can be used as an effective coordination exercise. It is also indicated in the rehabilitation of patients with musculoskeletal disorders such as rheumatoid arthritis, osteoarthritis, and after fractures of the lower extremities, or after surgery of the knee and hip.

Prerequisites for Stair Climbing Exercises

The Exercised Leg: The essential prerequisite for the use of stair climbing exercises is the ability of the exercised leg to step up, and to elevate the body to the level of the step by active extension of the knee and hip. If this condition is fulfilled, the patient may do stair climbing exercises whenever indicated. In order to step up, the patient's hip flexors must rate at least "poor" for the lowest steps and better for higher steps. To elevate the body to the lowest step, the knee and hip extensors must be sufficiently strong (usually better than "fair"), the knee and hip extensors must have a sufficient range of motion, and this activity must not be too painful. In arthritic conditions pain may frequently be relieved or attenuated by systemic or intra-articular administration of hydrocortisone or similar steroids. If the exercised leg is too short, or cannot extend sufficiently to permit raising the supporting leg as high as the step, a shoe lift on the exercised side will remedy this difficulty.

The Supporting Leg: The only necessary condition for the supporting leg to permit stair climbing exercises is a sufficiently great extension of hip and knee to permit support. Pain and muscular weakness need not interfere if the supporting leg is stabilized either by a long leg brace or by a long leg cast.

Trunk, Neck, and Upper Extremities: As far as the remainder of the body is concerned, there are almost no special prerequisites, since most disabling conditions can be remedied by braces or apparatus. If the shoulders are flail, the upper extremities should be supported in a sling or similar apparatus to prevent stretch injury to the shoulder. If there is neck weakness, a Thomas collar or other support is used to stabilize the head. Trunk weakness requires the use of a back brace or body corset.

Respiration: In patients with paralysis of respiratory muscles, stair climbing exercises can be carried out with a chest cuirass respirator, positive pressure breathing, or expiratory assist.

Heart: Impairment of cardiac function may be a limiting factor. A patient

in congestive failure should not do stair climbing. Patients with auricular fibrillation, even without congestive failure, should be digitalized prior to stair climbing exercises. Angina pectoris is no contraindication provided the patient exercises with a speed and step height which does not cause symptoms.

Summary

Stair climbing is a valuable method for strengthening of trunk and lower extremities, development of lower extremity coordination, gait training and graded exercises in cardiac or respiratory disabilities. The main advantages of stair climbing exercises as compared to standard exercises are:

1. Greater effectiveness.
2. Easier availability.
3. Greater economy in personnel and equipment.
4. Applicability to patients who are not able to carry out standard exercise programs because of mental and psychological limitations.

Necessary prerequisites for the use of stair climbing are:

1. That the supporting leg can be fully extended.
2. That the exercised leg can be lifted onto the step.
3. That the body can be elevated to the height of the step by active extension of the exercised leg.

Reference

1. Benedict, F. G., and Parmenter, H. S.: The Energy Metabolism of Women While Ascending or Descending Stairs. Am. J. Physiol. 84:675, 1928.

SUCCESS IS THE KEYNOTE

of our Philadelphia — 1958 meeting! An interesting scientific exhibit will contribute much to our success. In addition to the tremendous value of these exhibits, YOU have the opportunity to be considered for one of the coveted awards. Requests for applications for scientific exhibit space in connection with the 36th annual session scheduled for August 24-29, 1958, Hotel Bellevue-Stratford, Philadelphia, are now being received. Official blanks will be mailed after January 1, 1958. Address all communications to the American Congress of Physical Medicine and Rehabilitation, 30 N. Michigan Ave., Chicago 2, Illinois.

IMPORTANT ANNOUNCEMENT

American Board of Physical Medicine and Rehabilitation

The next examinations for the American Board of Physical Medicine and Rehabilitation will be held in Peoria, Ill., June 20 and 21, 1958. The final date for filing applications is February 1, 1958. Applications for eligibility to the examinations should be mailed to the Secretary, Dr. Earl C. Elkins, 200 First St., S. W., Rochester, Minn.

Advantages of Intermediate Prosthesis in the Rehabilitation of the Lower Extremity Amputee: Preliminary Report

Harry J. Bugel, M.D.
Nashville, Tenn.
William Zilmer
Chicago
and
Jack Grigsby
Nashville, Tenn.

● A physical medicine and rehabilitation program utilizing an intermediate prosthesis for amputees has been successful over the past years in reducing the time interval between amputation and ambulation, with subsequent improvement in patient morale and well-being.

This is a report of seven years' experience in the use of the intermediate prosthesis in the physical rehabilitation of the lower extremity amputee. The intermediate prosthesis is prepared at low cost. Functionally, it is comparable to a permanent prosthesis. It is used for therapeutic testing, as a temporary prosthesis, for the development of new prosthetic methods, or for training purposes. It is indicated early in the rehabilitation program. It aids in reducing hospitalization time and cost; training difficulties are decreased; the stump is better prepared for permanent prosthetic wear.

Preparation of Intermediate Prosthesis

From used prosthetic legs of satisfactory condition, the foot, ankle and lower third of the foreleg are used for a propulsion mechanism, so assembled that by the addition of either an above-knee or below-knee socket, an intermediate prosthesis is available (figs. 1 and 2). The prosthetic assembly is prepared through the cooperation of the orthotist. The socket is prepared from either plaster of Paris or collodion, contoured to the stump by the therapist. An ischial ring for weight bearing is incorporated for the below-the-knee amputee. The above-knee socket has a built-in ischial seat. The prosthesis is properly aligned statically and dynamically to provide a gait of acceptable appearance. The intermediate prosthesis is structurally sound. In the seven years that this procedure has been in use, no injury to a patient has occurred. This prosthesis is comfortable, stable, and as durable as the permanent prosthesis. The weight is comparable to that of the permanent prosthesis.

Basic Elements of Amputee Program

The physical rehabilitation of the lower-extremity amputee begins with the election of the amputation site. Consultation with a physiatrist is held. His judgment, based upon knowledge gained from previous experience in physical rehabilitation with diverse types of amputees, under all sorts of circumstances, is a most valuable asset in making this decision.

In election of the amputation site, consideration is given to type of disease, anticipated fit, alignment and training problems, degree of success in similar instances, and the anticipated life expectancy of the patient.

Beginning also at this time is the rehabilitation counseling of the patient by the physiatrist, and orientation with the physical medicine rehabilitation team. A program of pre-amputee physical therapy is started on the ward or clinic if the patient's condition permits. The exercises are active to active resistive for the uninvolved extremities and to the parts proximal to the anticipated amputation. These exercises are intended to maintain muscle strength, muscle tone, coordination, and range of motion of the joints. Contractures of the hips and knee are

Read at the Midwestern Section Meeting, American Congress of Physical Medicine and Rehabilitation, Minneapolis, April, 1953.
Chief, Physical Medicine and Rehabilitation Service, VA Hospital.
Formerly, Chief of Corrective Therapy, VA Hospital, Fort Benjamin Harrison, Indianapolis; now, Executive Assistant, VA Research Hospital.
Physical Therapist, Chief, Exercise Section, Thayer VA Hospital.

Fig. 1 — Intermediate prosthetic assembly usable for above-knee or below-knee stumps.

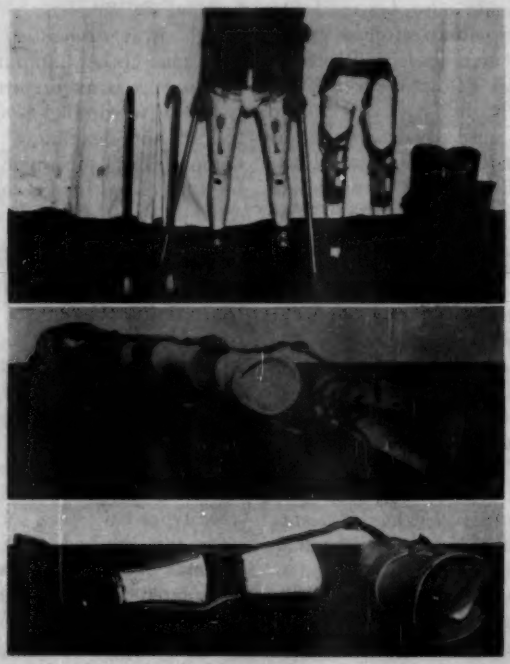


Fig. 2 — Intermediate prosthetic assembly adaptable only to above-knee or below-knee as shown.

prevented, and the morale of the patient is maintained at a high level. Appropriate occupational therapy is used when indicated. The program is adaptable to the upper-extremity amputee as well. Therapy is only interrupted during the period of surgery, and is resumed immediately postoperatively, modified as is indicated by the operative procedure. The patient and the therapist become "buddies."

Early in the postoperative period, physical therapy is resumed. With the nursing service, proper bed posture is taught and maintained. The presence of traction to the skin overlying the stump or of posterior splints should not interfere with active therapy to the unaffected extremities or muscle setting of the involved extremity. Following removal of sutures, the patient is instructed in proper bandaging of the stump, hygiene of the stump, and the development of proper mental attitude toward stump pain and phantom sensation. Some patients derive much help from discussing their situation with well-adjusted amputees. This is best accomplished at about the time the amputee becomes ambulant. The patient should also be made to realize that extirpation surgery of an extremity is decisive, but that mental extirpation of an extremity is a likely improbability. Rather, a psychologic adjustment to surgical extirpation is made by the individual. This adjustment is facilitated by the intermediate prosthesis.

Intermittent whirlpool, 30 minutes twice daily, is often included in the hygiene program or for those stumps in which wound healing is slow. This is done by immersing the stump for 3 minutes in water at 98.6 F. in which sufficient benzalkonium (Zephiran) to produce a 1:100,000 solution has been added. Then the patient lies supine for 2 minutes with the leg elevated. This procedure facilitates development of circulation of the stump, cleans the stump, reduces skin flora, aids in wound healing, and is an excellent method for indoctrinating the patient in stump hygiene. A stump hygiene program should also be carried out at home by the patient. Appropriate therapeutic exercises to maintain muscle tone and muscle strength are continued in the clinic. An intermediate prosthesis, as previously described, is prepared for the patient. This is usually 10 to 14 days from the date of surgery in the uncomplicated case. This period can be longer when wound healing is retarded because of inadequate circulation. Ambulatory tolerance is developed. This requires only a few days. All patients are ambulated on crutches as early as the postoperative progress permits, using swing-through gait. Bilateral amputees are not ambulated until they receive the intermediate prosthesis. In hemipelvectomy, the sooner the intermediate leg is prepared the better as it affords support to the recently resected lateral abdominal wall. Once the patient is ambulatory on an intermediate prosthesis, he spends most of his time on leave of absence until the permanent prosthesis is finished. The patient is recalled for "check-out" of the new prosthesis in the rough. On receiving the permanently finished prosthesis, the patient is again given a functional examination and, if prosthetic dependence is satisfactory, he is discharged from the hospital the same day. The intermediate prosthesis is dismantled in preparation for some other amputee. Since the stump sock is an important part of the patient's wardrobe, he is instructed in its care and cleanliness. When a patient demonstrates prosthetic independence, he is measured for a permanent prothesis.

Discussion

The intermediate prosthesis is used in the training program of amputees of all causes, especially for those patients whose amputations have resulted from complications related to peripheral vascular disease. It has been used in over 50 cases. Hemipelvectomy, hip disarticulation, long and short above-knee, knee-end bearing, and long and short below-knee types have been successfully treated with this method. Age is no barrier. Patients 24 to 83 years of age have been ambulated in this manner. Although some of the older amputees have passed away, the remainder express satisfaction with this type of training program. Much

credit is given to the therapists for success of the program.

Many of the patients with mid-thigh amputations received suction socket prosthesis. Here the intermediate prosthesis can complement the use of the alignment jig.

Case Histories

1. The leg of a 31-year-old man was amputated above the right knee on March 8, 1956, because of osteomyelitis, secondary to a fracture of the femur and tibia and loss of the patella. Sutures were removed on March 19. An intermediate prosthesis was constructed and patient ambulated 4 days later. He was measured for a suction socket prosthesis on April 11, had his initial check on May 6, and was discharged May 10. The patient was seen on recall in February, 1957. He was using the same prosthesis, no alterations having been made.

2. A 27-year-old man sustained multiple gunshot wounds just prior to the termination of the Korean conflict. The right shoulder joint was completely destroyed. A right below-the-elbow amputation was present. A below-elbow arm was issued and was proficiently used. The right knee was fused, but osteomyelitis developed. An above-knee amputation was done on March 19, 1956. Sutures were removed on March 30. An intermediate prosthesis was prepared and the patient ambulated by April 6. Ambulation was with crutches and cane, in the clinic, on the ward and at home. The patient was measured for suction socket prosthesis on April 17, the initial check-out was on May 9, and the patient was discharged 19 days later, ambulant without a cane. In January, 1957, he was using the same prosthesis satisfactorily, with or without a cane. No revision of the socket had been done as yet.

3. Bilateral above-knee and above-knee-below-knee amputees are ambulated without difficulty. It is best if above-knee-below-knee amputees are ambulated on the below-knee amputations with crutches initially and subsequently ambulated on the above-knee amputation. For the bilateral above-knee amputee, ambulation is begun on both extremities simultaneously. Follow-up in the following case is seven years.

A 24-year-old man fell beneath the wheels of a freight train on February 18, 1950, and suffered bilateral traumatic above-knee amputations. The left stump was 5 inches, and the right stump was 3 inches. He also received multiple fractures of the right wrist and forearm. He received two bottles of blood plasma and seven whole blood transfusions. He was referred to the physical medicine and rehabilitation section on March 3. A complete program of stump care of a bed patient was prescribed and administered. On March 13, a closed reduction of the fractures of the right arm was done. A month later the patient developed homologous serum hepatitis, secondary to transfusions received 55 days before. A diagnosis of patent ductus arteriosus Botalli was also made. On June 13, a revision of the left stump was performed with good recovery. The cast on his right arm was removed 9 days later.

It was not until August 4 that clinic team opinion indicated using lower-extremity prosthesis. The patient had recovered from homologous serum hepatitis. Range of motion in the right upper extremity was now normal. His grip tested at 22 lb. Both hips were adequately mobile without contracture.

On August 15, he received a left, above-knee intermediate prosthesis. When balancing was satisfactory with crutches (Aug. 22) a right intermediate prosthesis was prepared. By September 12, satisfactory gait with crutches was performed. He was measured for permanent limbs. On September 20, the patient was given a leave of absence to return when permanent limbs were ready. On October 30, initial check was satisfactory. The patient was ambulant with Canadian crutches on level ground, rough ground, and up and down stairs, and could get in and out of a wheelchair. He was discharged on November 3, 1950. Two years later no revisions of stump or prosthesis had been made. He has been financially successful. On June 20, 1955, a new right, above-knee prosthesis was issued to him by the state rehabilitation group, his first since hospital discharge.

4. Two patients, both age 35, of same weight and body stature, with identical amputations of the left leg, below the knee, were hospitalized at approximately the same time (March, 1950). One patient was ambulated with a minimum of 14 days therapy using the intermediate prosthesis. The other was treated without use of the intermediate prosthesis. Both were issued a permanent prosthesis on the same day. The patient who wore the intermediate prosthesis was immediately discharged from the hospital as an excellent walker. The second patient required additional training in the use of his prosthesis.

One of the amputees had active pulmonary tuberculosis, which, when treated, was improved. He was a washroom ambulant. He was seen by a physiatrist who agreed that the intermediate prosthesis might be convincing as a therapeutic test as to whether or not patients with tuberculosis should have a prosthesis following amputation. Within five days after the program was started, the patient became ambulatory. He was observed carefully for approximately two months. During this period, he demonstrated no exacerbation in his disease.

5. For patients with cardiac disease or in whom vascular insufficiency of the opposite extremity might be of such severity as to pro-

hibit a permanent type prosthesis, the intermediate leg is successful as a temporary measure.

To demonstrate its use as a therapeutic trial, the following case is presented. The patient, aged 53, was admitted to the hospital on July 7, 1950 with the following diagnoses: (1) Rheumatic hypertensive and arteriosclerotic heart disease; enlarged heart; right mitral stenosis, mitral insufficiency; right ventricular hypertrophy; auricular fibrillation; Class 2b; (2) left optic atrophy; (3) traumatic operative absence of the left lower extremity, mid-femur; (4) chronic passive congestion of the liver, secondary to his heart disease. He received appropriate medical care and at his own request was referred for a prosthesis. An intermediate prosthesis was made for this patient on August 11. He was ambulant with a cane or in parallel bars. It was noticed at this stage that the patient's physical capacity to carry on further training was not sufficient. Easy fatigability, profuse sweating, irregularity of pulse, slow compensation of pulse, and inequality of volume of pulse were found. On several occasions, daily clinic instruction was interrupted because of the patient's inability to recover his tolerance from day to day. On several occasions, the stump became edematous, so that the prosthesis would not fit. On September 19, it was recommended to the medical service that the patient be re-evaluated in the light of recent findings from a therapeutic trial of ambulation on a prosthesis. A permanent prosthesis was not issued.

Reduction in Training Time

Accurate data is maintained on all amputees using the intermediate prosthesis. Included is age, race, cause of amputation, site of amputation, date of surgery, date patient receives intermediate prosthesis, date measured for permanent prosthesis, date of initial check-out on new limb, date of issue of new limb, and hours of training (see tables 1-5). Comparison is made in tables 1-4 to data of other amputees who have not used an intermediate prosthesis but who were treated in comparable manner otherwise. When the total days from date of amputation to date of ambulation is compared for the two groups, the following is noted: The below-knee amputee who uses the intermediate prosthesis consumes 30.2 days (table 4) as against 186.6 days for those who do not (table 3); the above-knee amputee consumes 42 days (table 2) as against 145.5 days (table 1).

Table 1: Above-Knee Amputation Without Use of Intermediate Prosthesis

Patient		Amputation Data		Prosthesis Data				No. Days to Ambulation from:	
No.	Age	Cause	Date	Received in Rough	Returned to be Finished	Received Finished	Discharged from Hosp.	Prosthesis	Amputation
*1	22	Gunshot wound	11-9-46	6-24-52	7-14-52	7-25-52	9-23-52	79	123
2	55	Osteogenic sarcoma	3-22-51	6-11-51	7-3-51	7-12-51	7-20-51	29	120
3	43	Osteogenic sarcoma	6-23-53	10-19-53	11-2-53	11-23-53	11-28-53	17	151
4	39	Buerger's disease	4-16-52	6-5-52	7-3-52	7-15-52	7-30-52	43	104
5	66	Arterio-sclerosis	3-4-52	6-27-52	6-23-52	7-9-52	7-22-52	72	142
6	30	Giant cell tumor	11-2-52	12-29-52	1-21-54	1-27-54	1-29-54	25	87
7	52	Buerger's disease	10-23-52	1-5-53	2-12-53	2-25-53	3-5-53	46	133
8	56	Burns	12-18-51	4-4-52	5-8-52	5-26-52	6-6-52	45	170
9	41	Embolus	11-28-51	6-11-52	8-12-52	8-18-52	8-22-52	76	267
10	60	Buerger's disease	6-13-52	11-3-52	11-26-52	12-12-52	12-16-52	27	186
11	54	Diabetes Arterio-sclerosis	10-25-52	1-4-54	2-6-54	2-16-54	3-6-54	40	117
							Average	47.9	145.5

*This patient would not wear his leg initially. Time is computed from day he began PMR program for amputees.

Note: Time for training with leg in rough to time leg returned to be finished and time when leg received to discharge is same as time from beginning use of training leg to time leg is measured for prosthesis, since each represents training time to MHB using prosthesis or equivalent.

Table 2: Above-Knee Amputees Using an Intermediate Prosthesis

Patient No.	Age	Amputation Data Cause	Date	Prosthesis Data: Intermediate Prosthesis Received	Measured for Prosthesis	Discharged from Hospital	No. Days to Ambulation from: Intermed. Prosthesis	Amputation
5	59	Embolus	12-7-53	5-19-54	5-27-54	6-18-54	9	72
7	51	Osteomyelitis	12-10-54	12-23-54	1-5-55	2-1-55	13	26
8	59	Osteomyelitis (Blind)	12-10-54	12-28-54	1-4-55	2-10-55	7	25
9	73	Osteomyelitis	5-16-54	5-28-54		No leg issued		
14	†36	Diabetes Arteriosclerosis	11-29-55	12-28-55	1-10-56	2-3-56	13	42
16	†39	Osteomyelitis	12-1-55	1-11-56	1-19-56	3-2-56	8	59
20	†*31	Osteomyelitis	3-8-56	3-23-56	4-11-56	5-10-56	19	34
21	†27	Gunshot Wound Osteomyelitis	3-19-56	4-6-56	4-17-56	5-29-56	11	29
4	55	Neurogenic Sarcoma	2-21-55	3-14-55	3-24-55	4-12-55 AWOL 9-7-55 MHB	11	33
						Average	11.3	42.0

*This patient is described in the case presentations.
†Suction socket prosthesis was issued.

Table 3: Below-Knee Amputations Without the Use of Intermediate Prosthesis

Patient No.	Age	Amputation Data Cause	Date	Prosthesis Data: Received in Rough	Returned to be Finished	Received Finished	Discharged from Hosp.	No. Days to Ambulation from: Prosthesis	Amputation
1	56	Arteriosclerosis	8-20-51	10-19-51	11-1-51	11-12-51	11-30-51	21	102
2	30	Buerger's disease	6-21-51	10-19-51	11-2-51	11-13-51	2-4-52	98	228
3	57	Arteriosclerosis	4-29-52	7-11-52	7-18-52	8-5-52	8-8-52	12	101
4	35	Trauma	5-2-52	8-28-52	10-17-52	11-3-52	11-3-52	51	195
5	58	Diabetes Arteriosclerosis	6-3-52	10-6-52	10-16-52	11-5-52	11-14-52	19	163
6	59	Peripheral vascular disease	12-1-52	2-11-53	2-26-53	3-17-53	3-25-53	17	114
7	58	Diabetes Arteriosclerosis Osteomyelitis	4-24-53	6-26-53	8-8-53	7-20-53	7-24-53	47	90
*8	32	Trauma	10-2-52	6-29-53	7-10-53	7-27-53	7-31-53	15	302 82
9	56	Peripheral vascular disease	5-14-53	7-29-53	8-10-53	8-27-53	9-1-53	17	110
10	34	Gunshot wound	5-14-53	7-14-53	7-24-53	8-10-53	8-13-53	13	90
11	39	Osteomyelitis	5-29-53	8-18-53	8-25-53	9-4-53	9-8-53	11	74
12	21	Osteomyelitis	7-21-53	9-3-53	9-15-53	9-23-53	11-23-53	72	125
13	64	Osteomyelitis	12-4-53	2-5-54	2-19-54	3-1-54	3-3-54	16	89
14	60	Malunion fracture	12-17-53	2-10-54	2-26-54	3-12-54	3-18-54	22	91
							Average	30.8	186.6

*This patient had a delayed union of the tibia and fibula of the opposite extremity which prohibited earlier ambulation.

Table 4: Below-Knee Amputation Using Intermediate Prosthesis

Patient		Amputation Data		Prosthesis Data			No. Days to Ambulation from:	
No.	Age	Cause	Date	Intermediate Prosthesis Received	Measured for Prosthesis	Discharged from Hospital	Intermed. Prostheses	Amputation
1	37	Trauma	4-8-54	4-12-54	4-22-54	5-24-54	10	20
2	34	Trauma	3-3-55	3-16-55	3-21-55	4-12-55	5	18
10	40	Osteomyelitis	12-17-53	4-8-54	4-15-54	5-11-54	7	30
13	55	Venous disease	11-10-55	12-12-55	12-20-55	1-24-56	8	41
15	38	Osteomyelitis	11-10-55	12-7-55	12-12-55	1-26-56	5	32
17	34	Buerger's disease	1-10-56	2-10-56	2-23-56	3-13-56	13	49
19	55	Osteomyelitis	1-3-56	1-20-56	2-3-56	4-12-56	19	86
22	61	Arteriosclerosis	3-23-56	4-18-56	4-30-56	5-30-56	12	33
23	47	Osteomyelitis	3-2-56	3-14-56	5-8-56	6-6-56		
		Reamputation	4-19-56	4-30-56			8	20
24	38	Venous disease	5-28-56	6-11-56	6-20-56	7-17-56	9	23
*25	62	Diabetes Arteriosclerosis	5-24-56	6-21-56	7-24-56	8-17-56	(33)	(83)
						Average	10.1	30.2

*This patient was ambulated, then put on trial visit to justify issuance of prosthesis. During 30-day period he experienced no problems which would rule out issuance of a prosthesis. Time is not included in the average figures.

Table 5: Bilateral Amputees Using Intermediate Prosthesis

Patient		Amputation Data				Prosthesis Data			No. Days to Ambulation from:	
No.	Age	Site	Cause	Date		Intermediate Prosthesis Rec. in Rough	Measured for Prosthesis	Discharged from Hospital	Intermed. Prosthesis	Amputation
6	28	AK(SS)	Trauma	4-19-55		6-28-55	11-21-55	10-2-55	AWOL	164
			Reamputation	9-23-55		11-8-55	11-21-55	12-20-55	MHB 96	
		BK	Trauma	4-20-55		8-25-55				
						11-8-55	11-21-55	12-23-55	59	182
3	33	AK	Trauma	2-15-51		6-24-55	8-30-55	9-5-55	64	—
		BK	Adm. 6-21-55	3-9-51		*7-18-55	8-30-55	9-5-55	42	—
18	55	BK	Buerger's	1934						
		AK	Disease	12-18-55		1-5-56	1-30-56	3-2-56	25	43
26	34	AK	Diabetes	3-12-54	rt.	9-9-54	9-22-54	10-23-54	12	40
	36	AK	Arteriosclerosis	8-9-55		9-2-55	9-6-55	10-11-55	14	24
40	24	AK		2-18-50		8-15-50	9-20-50	11-3-50	See case history	
		AK	Trauma	2-18-50		8-22-50				

Note: The bilateral amputees are listed separately because their problems are not reflected in either of the other amputee types.

SS — suction socket

*Readmitted for ambulation 6-21-55

Conclusions

The intermediate prosthesis program is psychologically sound. The patient becomes a member of the group of individuals who, for several weeks to come, are to be of considerable importance in the restoration of his ability to walk. The instruction of the patient prior to surgery, the close allegiance during the immediate postoperative period, and the use of the intermediate prosthesis early in the postoperative phase develop maximum motivation in the patient. The intermediate prosthesis by its early institution minimizes the possibility of the patient losing his ambulatory sense. He is ambulant in such a short period after his amputation that "alienation" has not had an opportunity to develop. Phantom limb phenomena in some instances is aborted or at least reduced in intensity by the psychological educational program

employed, coupled with the early ambulation program. Pain is also a less frequent problem, and training of the patient is simpler and requires less effort and time.

Because of the earlier weight bearing and ambulation on the intermediate prosthesis, prosthetic instability, impaired balance, impaired musculature, flexion contracture, unsatisfactory posture, and other often undesirable features related to delayed prosthetic ambulation do not develop.

The patient's interest remains high, he is more cooperative and does a better job in his training program. Once the patient has been ambulated on an intermediate prosthesis, the actual need for the permanent prosthesis can be prolonged; for example, amputation was performed on many of our patients in the early part of the year. Crops, which ordinarily could not be planted because the patient was not ambulatory, were planted. The patient can be sent home indefinitely on leave of absence ambulatory on his intermediate prosthesis. This has happened in a number of instances and, as a consequence, has resulted in a patient who has given more toward becoming a successful amputee than the amputee whose home activities are disrupted because of his inability to walk. The maintenance of adequate morale in the amputee is essential. The intermediate prosthesis is conducive to that end.

Hospitalization measured by days and hours is decreased tremendously, with savings both to the hospital and to the patient. In the Veterans Administration hospitals, it makes available additional beds which might otherwise be occupied by a nonambulatory amputee.

In those instances in which there is some hesitation about the indication for a prosthesis, this is a proper method to facilitate clinical judgment in difficult or doubtful situations.

To the limb manufacturer, the amputee has a more ideal stump for fitting and alignment. Ordinarily a patient receiving his first fit and alignment has difficulty walking on a prosthesis as he is unaccustomed to it. Our patients, during the initial fit and alignment, minimize the amount of work for the limb maker. The limb maker is appreciative of this and, in many instances, comments to us of the satisfactory gait at the initial fit of the patient. In the past seven years, several limb makers have pointed out that the patients whom they have seen subsequently require fewer adjustments to the socket of the prosthesis.

The amputee, either below-knee, conventional above-knee, suction socket, or hemipelvectomy, has not demonstrated instability, impaired balance, undesired stump characteristic, or other unwanted features because of the use of the intermediate prosthesis.

In difficult cases where doubt exists in what will be the best type of prosthesis, the intermediate prosthesis serves as a therapeutic experimental tool from which a permanent type prosthesis can be fabricated.

The type of assembly used in construction of an intermediate prosthesis need not be of any particular design but should be of such construction as to be durable, strong, readily adjustable, and reusable. In the completed form, it should have comparable weight to the permanent prosthesis.

Summary

A physical medicine and rehabilitation program utilizing an intermediate prosthesis for amputees has been successful over the past seven years in reducing the time interval between amputation and ambulation, with subsequent improvement in patient morale and well-being.

American Academy of Physical Medicine and Rehabilitation

Officers and Committees

1958

Officers

President — George D. Wilson
President-Elect — Louis B. Newman
Vice-President — Clarence W. Dail
Secretary — Harriet E. Gillette
Treasurer — James W. Rae, Jr.
Executive Secretary — Dorothea C. Augustin

Board of Governors

Robert W. Boyle
Clarence W. Dail
Harriet E. Gillette
Louis B. Newman
Max K. Newman
Ray Piaskoski
James W. Rae, Jr.
George D. Wilson

Advisory Committee for Advancement of Physical Medicine and Rehabilitation

Louis B. Newman, *Chairman*
Frances Baker
Joseph G. Benton
Donald A. Covalt
Harvey F. Davis
Murray B. Ferderber
A.B.C. Knudson
Lewis A. Leavitt
Herman L. Rudolph
Charles D. Shields
Emmett M. Smith
Samuel S. Sverdlik
George D. Wilson
Solomon Winokur

By-Laws

Robert W. Boyle, *Chairman*
Earl C. Elkins
Glenn Gullickson, Jr.
Miland E. Knapp
Frederic J. Kottke
Donald L. Rose
Dorothea C. Augustin, *Ex-officio*
F. Manley Brist, *Ex-officio*

Economics in Private Practice

Arthur A. Rodriquez, *Chairman*
Dominic A. Donio
Leonard J. Yamshon

Grievance

Clarence W. Dail, *Chairman*
Carl C. Hoffman
Lewis A. Leavitt

Liaison with American Congress of Physical Medicine and Rehabilitation

Louis B. Newman, *Chairman*
Harriet E. Gillette
Ray Piaskoski

Liaison with American Hospital Association

H. Worley Kendell, *Chairman*
Frank H. Krusen
Oscar O. Selke, Jr.

Liaison with Association of American Medical Colleges

Charles D. Shields, *Chairman*
James W. Rae, Jr.
Jerome S. Tobis

Liaison with Electromyography, Ultrasonics, and Mechanotherapy

William D. Paul, *Chairman*
O. Leonard Huddleston
David Rubin

Liaison with Anesthesiology, Pathology, and Radiology

Joseph L. Koczur, *Chairman*
Glenn Gullickson, Jr.
Ray Piaskoski
Ralph E. Worden

Membership

A.B.C. Knudson, *Chairman*
Sedgwick Mead
Edward M. Krusen, Jr.

Nominating

Herman L. Rudolph, *Chairman*
Glenn Gullickson, Jr.
A.B.C. Knudson

Program

Charles S. Wise, *Chairman*
Joseph G. Benton
Charles D. Shields

Research in Orthetics and Prosthetics

Herbert W. Park, *Chairman*
Robert L. Bennett
Roy H. Nyquist
Donald L. Rose
Odon F. von Werssowetz
Charles S. Wise

editorial

OFFICIAL JOURNAL
AMERICAN CONGRESS OF PHYSICAL MEDICINE AND REHABILITATION
AMERICAN ACADEMY OF PHYSICAL MEDICINE AND REHABILITATION

The Ethical Point of View

In 1936 the American Congress of Physical Medicine and Rehabilitation (then known as the American Congress of Physical Therapy) established the American Registry of Physical Therapists under the sanction and guidance of the American Medical Association. The purposes of the Registry were: to assist in establishing minimal standards of education for physical therapists, to promote more adequate education, to provide a national examining and qualifying board, and to establish a standard of professional ethics for physical therapists on a par with the standard of ethics for physicians established by the American Medical Association. The American Registry of Physical Therapists has been influential in deterring the training or employment of inadequately trained or unethical therapists.

A comprehensive qualifying examination has been developed by the members of the Board of the Registry in consultation with a counselling psychologist. This objective examination has been in operation now for sixteen years. The pool of questions from which an examination is constructed is reviewed periodically to make any additions or revisions which changes of medical practice may require. The Registry examination has been of value not only in establishing the qualifications of graduating therapists but also in demonstrating weaknesses which have occurred in the curricula of the various schools. As a result, this test has become the standard of competence of physical therapists in the United States. Today over 7600 therapists are members of the American Registry of Physical Therapists.

Another and possibly a more important function of the American Registry has been to establish an ethical standard for physical therapists. The basic tenet of medical ethics is that the interests of the patient are of paramount importance in medical practice. Since physical therapy is a part of medical practice the same ethical principle applies. Physical therapists are trained to practice under the prescription and direct supervision of competent physicians. The training of the physical therapist, as the name implies, is in the knowledge and skills of therapy. In no school recognized by the Council on Medical Education and Hospitals of the American Medical Association nor by the American Registry of Physical Therapists are physical therapists adequately trained to evaluate, diagnose, and prescribe for patients. In order to acquire the knowledge and judgment necessary for licensure to diagnose and prescribe, physicians are required to undertake five to ten years of intensive medical education. By combining the knowledge of the physician to evaluate and prescribe with the knowledge and skill of the therapist to apply treatment, the best possible results are obtained. Under the standard of medical ethics of the American Medical Association and the standard of ethics of the American Registry of Physical Therapists, lesser competence in evaluation of patients and prescription of therapy is not permissable. Unfortunately the basis of medical ethics, which places the patient's welfare first, interferes with the desires and ambitions of a small minority of therapists. Some of these unethical therapists find this tenet interfering with their financial gain; others find the same principle interfering with their desire for therapeutic omnipotence. It is commendatory that only a very small proportion of physical

therapists have had their registration in the American Registry of Physical Therapists revoked for violation of the code of ethics.

Ambition has led other therapists who were not willing to defy openly medical ethics in an effort to circumvent these principles. For the last few years the point of attack has been the American Registry since it is continually vigilant for evidence of unethical activity. Subtle attempts to undermine the American Registry have not been successful, so recently more open attacks have been made. These attacks on the American Registry have taken many forms: that the Registry is antiquated; that the Registry is not legal; that the tests are drawn up by an incompetent and unknown psychologist; that the Registry does not represent the medical profession; that the Registry does not represent the physical therapists; that membership in the Registry is not required for employment and therefore is worthless; that the therapists can and will do the same job themselves. In regard to the last argument it would be well for all physicians and all ethical therapists to keep in mind that the American Physical Therapy Association has approved a Section on Self Employment for therapists not working under direct medical supervision and that the business meetings of this Section have been closed even to other therapists!

In the October, 1957, issue of *The Physical Therapy Review* there appeared in the Student Column "an open letter to a student." Since this column usually contains material written by students many readers presumed that this letter was written by a student. However, there is nothing in the letter which states that the anonymous writer, "Jean," is a student. This letter appears to be one of the mentioned attacks on the Registry. The gist of the letter is that the American Registry is a private organization which gives an examination which has no real status, and a registrant member is not a real member because she has no vote. The American Physical Therapy Association is presented in contrast as a professional organization with membership participation which promotes the status and standards of physical therapy. Graduation from an approved school of physical therapy rather than examination by the Registry "is the criterion of qualification as a physical therapist." If the context of this letter does not concern itself with questions of basic professional ethics, the technic of inserting a carefully constructed piece of propaganda into a student column and signing a pseudonym does relate to ethics.

Adherence to the basic principles of medical ethics is fundamental to sound medical practice. Physical therapy is an essential part of medical practice. Physical therapy independent of medical knowledge and judgment is not only incomplete but unsafe for the patient and on this basis becomes unethical.

The physical therapist who is a registrant of the American Registry of Physical Therapists is demonstrating both her intellectual ability and her adherence to the medical code of ethics. She takes her place beside the physician in placing the welfare of the patient first. The registered physical therapist has become a member of a medical team in order to combine her abilities with those of the physician to provide the best possible care for her patients.

—*Frederic J. Kottke, M.D.*

Awards of Merit for the Year 1957

The Committee on Gold Key Award presented through its chairman, Dr. Arthur C. Jones, the distinguished service key to:

Karl Harpuder, M.D.

KARL HARPUDER, M.D. — Physician, Educator and Humanitarian: Who has earned the respect of his associates by his wisdom, counsel, good-will and fellowship; has rendered great service to the field of physical medicine and rehabilitation by his special work in peripheral vascular diseases and in arthritis; who, by his tireless efforts and many accomplishments has notably advanced the Science and the Art of Physical Medicine and Rehabilitation.

Dr. Harpuder received his degree in medicine in 1919 from the University of Munich. While in Munich, he did much work on purine metabolism, electrolyte balance, and vascular physiology. He came to the United States in 1934 where he became a member of the staff of the Montefiore Hospital in New York City. There he became Assistant Clinical Professor of Medicine and later, Assistant Professor at Columbia University College of Physicians & Surgeons. He has done considerable work in his special chosen area of peripheral vascular diseases and arthritis.

In 1947 he was certified to the American Board of Physical Medicine and Rehabilitation; in 1948 he was certified to the American Board of Internal Medicine. He has served as senior consultant in physical medicine to the New York City VA Hospital and is a lecturer in physical medicine and rehabilitation at New York Medical College.

As a member of the Editorial Board of the *American Journal of Physical Medicine* and author of numerous publications on vascular physiology in peripheral vascular diseases and in physical medicine and rehabilitation problems, Dr. Harpuder has contributed significantly to the field of medical literature.

A devoted and much loved teacher, he has been a staunch supporter of physical medicine and rehabilitation throughout his career and has served as president of the New York Society of Physical Medicine and Rehabilitation and the Eastern Section of the American Congress of Physical Medicine and Rehabilitation. Men whom he has trained are now directors of departments and professors throughout the country. He is a member of the American Medical Association, New York State and Bronx Medical Society, New York Academy of Medical Science, American Academy of Physical Medicine and Rehabilitation and the American Heart Association as well as a senior member of the International Society for Angiology.

WILLIAM H. SCHMIDT, M.D. — Physician, Educator and Humanitarian: Who has earned the respect of his associates by his wisdom, counsel, goodwill and fellowship; has rendered great service to the field of physical medicine and rehabilitation and to the field of radiology; has pioneered in the development of technical methods in electrosurgery; has contributed his services as author; has been and is a loyal and

William H. Schmidt, M.D.

enthusiastic worker in the organizations associated with physical medicine and rehabilitation; who, by his tireless efforts and many accomplishments has notably advanced the Science and the Art of Physical Medicine and Rehabilitation.

After receiving his medical degree from the University of Pennsylvania, Dr. Schmidt started his medical practice in Atlantic City. In 1916, he joined Dr. William L. Clark in Philadelphia where he has been ever since. As Associate Professor of Physical Medicine on the faculty of the Jefferson Medical College, he has directed the department of physical medicine since 1921. Since this time, close to five thousand Jefferson graduates have been exposed to the teachings and principles of physical medicine and rehabilitation.

A charter member of the American Board of Physical Medicine and Rehabilitation, he served as Vice-Chairman of this Board in 1954. Dr. Schmidt is also a diplomate of the American Board of Radiology. In addition to his affiliation with Jefferson Medical College and Hospital, he is consultant in physical medicine and rehabilitation to the VA Hospital and radiologist at St. Mary's Hospital in Philadelphia.

He holds membership in the Philadelphia County Medical Society, and the American Medical Association. He is past president of the American Congress of Physical Medicine and Rehabilitation, past president of the American Academy (then Society) of Physical Medicine and Rehabilitation, and past president of the Pennsylvania Academy of Physical Medicine. He served as chairman of the Section of Physical Medicine of the American Medical Association in 1955.

He is a member of the Committee on Physical Medicine and Rehabilitation both in the Philadelphia County and Pennsylvania Medical Societies. He has authored over thirty papers on physical medicine and rehabilitation, and has contributed to the Albright and Price volume of *Practical Therapeutic Rehabilitation*. Dr. Schmidt did research and developed technical methods in electrosurgery with Dr. William L. Clark and was one of the pioneers in developments in fever therapy.

By his long and continued service in teaching at Jefferson Medical College, Dr. Schmidt has perhaps apprised more medical students of the principles of rehabilitation than any other physician in the country. Many of these medical students have entered the practice of physical medicine and rehabilitation and recently several have been certified or are in residency training.

In 1955, he was given the Presidential Award for Pennsylvania, in recognition of his outstanding contributions to the employment welfare of the physically handicapped of the state.

He is still active, giving of his time and services teaching medical students, serving on committees locally and nationally, and continues to advise as a respected senior member of all organized bodies interested in the field of physical medicine and rehabilitation.

Awards to Scientific Exhibitors

The committee on Awards for Scientific Exhibits presented through its Chairman, Dr. Bernard Stoll, the following (Dr. Karl E. Carlson, a member of the committee, officiated in Dr. Stoll's absence):

Gold Medal to Lewis Cohen, M.D., for the exhibit "Electrovasography: Quantitative Diagnosis in Vascular Disorders."

Dr. Lewis Cohen (right) accepts the gold medal and congratulations from Dr. Karl E. Carlson of the committee on Awards for Scientific Exhibits.

Silver Medal to Harriet E. Gillette, M.D. for the exhibit "Total Management of Muscle Dysfunction."

Dr. Harriet Gillette is shown accepting the presidential plaque of the American Academy of Physical Medicine and Rehabilitation on behalf of the retiring president, Dr. Murray B. Ferderber, from the president, Dr. George D. Wilson.

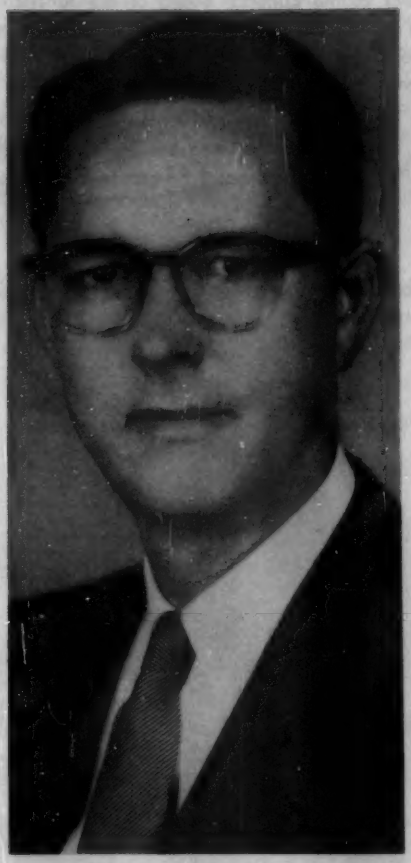
Bronze Medal to William J. LaJoie for the exhibit "Rheumatoid Arthritis."

Dr. William J. LaJoie (right) is shown accepting the bronze medal for his exhibit from Dr. Karl E. Carlson.

Essay Award

The Committee on Essay Award, presented through its Chairman, Dr. Arthur A. Rodriquez, the award to J. B. Redford, M.D., for his paper "The Effects of Breathing Exercises on Pulmonary Emphysema." Dr. Redford is a Fellow of the Office of Vocational Rehabilitation at the Mayo Clinic.

May We Present . . .



Donald L. Rose, M.D.

. . . the President of the American Congress of Physical Medicine and Rehabilitation for 1957-58, Doctor Donald Lee Rose, of Kansas City, Kans.

The Congress membership welcomes the opportunity to introduce their executive officer, Doctor Rose, who was graduated from the University of Colorado School of Medicine in 1936. Following his internship, he was married to Martha Jane Koontz on March 6, 1937. In succeeding years became a diplomate of the National Board of Medical Examiners, and research associate, Kettering Institute for Medical Research. Of great import were his contributions in the Fever Therapy and Physical Therapy Sections of the Walter Reed Army Hospital during the majority of his military service from 1941 until his assignment with the Office of the Surgeon General in the Reconditioning Consultants Division which terminated in 1946. Since that time, Doctor Rose has served prominently as a Baruch fellow in physical medicine; president, American Academy (formerly Society) of Physical Medicine and Rehabilitation, 1954; consultant in physical medicine to the Office of the Surgeon General; member, Medical

Advisory Council, American Occupational Therapy Association; member, Board of the American Registry of Physical Therapists; area specialty consultant, Veterans Administration; and member, Hospital Advisory Council, Kansas State Board of Health.

He is also a member of the Editorial Board of the *American Journal of Physical Medicine* and *Arthritis and Rheumatism* as well as a member of the Society of the Sigma Xi, the American Association for the Advancement of Science and American Rheumatism Association.

Since becoming a diplomate of the American Board of Physical Medicine and Rehabilitation in 1947, Doctor Rose has been and is currently professor and chairman of the Department of Physical Medicine and Rehabilitation at the University of Kansas School of Medicine.

George D. Wilson, M.D.

. . . the president of the American Academy of Physical Medicine and Rehabilitation, for 1957-58, Doctor George Darwin Wilson of Asheville, North Carolina.

The members of the Academy are pleased to acquaint you with their principal exponent in the private practice of physical medicine and rehabilitation. Notable service in the field has been rendered by Doctor Wilson since his certification by the American Board of Physical Medicine and Rehabilitation in 1947 and of more con-

sequence, since he received his medical degree from Temple University in 1937. Doctor Wilson was married to Gladys Mullen on April 30, 1938. He initiated his medical career as an instructor at Louisiana State University Medical School and from 1939 to 1941 was engaged in general private practice. The U. S. Army Medical Corps availed itself of his medical knowledge until 1946 when he assumed the duties of Director of the National Society for Crippled Children and Adults. Doctor Wilson has made outstanding contributions to the literary field, among them being editor of "The Quarterly" (Journal of Phi Beta Pi Medical Fraternity), as well as presently serving as area consultant, VA office; consultant, Surgeon General Office. He holds membership in the North Carolina Medical Society; American Medical Association; American Congress of Physical Medicine and Rehabilitation; American Medical Writers' Association; American Association for the Advancement of Science; Southern Medical Association, and is a recipient of the Legion of Merit award.

He is continually interested in clinical research in muscular dystrophy and relaxant drugs in spastic paralysis. As a representative of the State of North Carolina, he was the first physiatrist to be appointed a councilor of the Southern Medical Association.

Harriet E. Gillette, M.D.

. . . the secretary of the American Academy of Physical Medicine and Rehabilitation, Doctor Harriet Ellen Gillette, of Atlanta, Georgia.

Awarded a medical degree from Rush Medical College in 1940, Doctor Gillette established private practice in Florida, specializing in diseases of women and children. The National Foundation for Infantile Paralysis granted her a fellowship in physical medicine and rehabilitation in 1947 and after taking her training, she served as medical director of Aidmore Crippled Children's Hospital for the succeeding three years. Doctor

Gillette's private practice in the specialty since 1951 and diligence in serving many crippled children's societies as cerebral palsy consultant earned for her the honor of "Woman of the Year" by the American Medical Women's Association in 1955.

She has authored several articles for medical publications; is a diplomate of the American Board of Physical Medicine and Rehabilitation; is a member of the American Medical Association, Georgia Medical Association, and numerous other medical associations. She was the recipient of the Richard Kovács Memorial Fellowship in 1956 awarded through a special fund established by the American Congress of Physical Medicine and Rehabilitation, which enabled her to attend the Second International Congress of Physical Medicine in Denmark.

James W. Rae, Jr., M.D.

. . . the treasurer of the American Academy of Physical Medicine and Rehabilitation, Doctor James Weaver Rae, Jr., of Ann Arbor, Michigan.

Now serving as Director of the Department of Physical Medicine and Rehabilitation at the University of Michigan, Doctor Rae holds his degree in medicine from the same university, which was conferred in 1943. He received a fellowship in physical medicine from the Mayo Foundation in 1947 and trained there until 1950.

Doctor Rae's contributions to scientific journals have been many. He is an active member of the American Congress of Physical Medicine and Rehabilitation as well as the American Medical Association, Michigan Rheumatism Society, Society of the Sigma Xi. In 1952 he was certified as a diplomate of the American Board of Physical Medicine and Rehabilitation.

. . . the most recent appointee to the Board of the American Registry of Physical Therapists, Doctor Oscar O. Selke, Jr., of Houston. Now serving as Medical Director of the Hermann Hospital School of Physical Therapy, Doctor Selke was introduced to the readers of this section in the January, 1957, issue of the journal upon his election to the *ARCHIVES* Editorial Board. He was certified as a diplomate of the American Board of Physical Medicine and Rehabilitation in 1949 and is an active member of the American Medical Association, Southern Medical Association, American Congress and the American Academy of Physical Medicine and Rehabilitation.

J. B. Redford, M.D.

. . . the recipient of the 1957 Essay Award, Doctor J. B. Redford, for his paper, "The Effects of Breathing Exercises on Pulmonary Emphysema." Born in Victoria, British Columbia in 1928, Doctor Redford was educated at the University of British Columbia and the University of Toronto Medical School. Since 1955 he has been in postgraduate training at the Mayo Foundation and has recently become a Fellow of the Office of Vocational Rehabilitation at the Mayo Clinic.

abstracts

Treatment of Patients with Cervicodorsal Outlet Syndrome. P. A. Nelson. J.A.M.A. **163**:1570 (Apr. 27) 1957.

Pain, numbness and discomfort in the shoulder and upper extremity can be caused by compression or stretching of the neurovascular structures in the region of the cervicodorsal outlet. Patients with mild symptoms have intermittent aching, pain, numbness, paresthesias, stiffness or a dragging feeling localized to the ulnar side of the hand but occasionally involving the arm, chest wall and neck. Patients with moderate symptoms have additional symptoms of blanching, increased duskiness or increased sweating of involved areas, which may be reproduced with certain positions of the arms. Those with severe involvement may also have loss of sensation, weakness in specific muscles, swelling near the base of the neck, and sores on the tips of the fingers.

Diagnosis depends upon a detailed history, X-ray examination, laboratory workup and a careful physical examination, noting particularly any abnormal stance, drooping of shoulders, dorsal kyphosis or scoliosis, any muscular weakness, sensory loss, abnormal reflexes and limitation of joint motions. Special attention should be paid to the amplitude of the radial pulse during the maneuvers of hyperabduction, forced depression of the shoulder girdle, the Adson and Allen test.

In the differential diagnosis of this condition, one must consider the following: (1) Osteoarthritis. The pain of osteoarthritis is usually the result of direct pressure on a nerve root by an osteophyte, arises in the back of the neck and radiates down the arm to the wrist or fingers. Manual downward pressure on the vertex may aggravate this pain whereas upward traction beneath the chin may relieve it. (2) Protrusion of a cervical intervertebral disc causes pain by compression of a nerve root. This is greatly aggravated by any motion of the neck, coughing or straining. Reflexes may be absent, there may be loss of sensation, muscular atrophy or weakness, and a narrowing of one or more cervical interspaces. (3) Anxiety tension state is shown by a sustained contraction or tightness of the upper trapezius, posterior cervical, and sternocleidomastoid muscles. (4) Compression neuropathy of the median nerve in the carpal tunnel may be diagnosed by reproduction of symptoms on extreme flexion of the wrist for 60 seconds, and by a positive Tinel's sign which is production of a tingling sensation in the hand by tapping over the median nerve in the wrist.

All patients whose condition has been diagnosed as outlet syndrome should have a 4-12 weeks' trial of physical therapy before surgery is advised. This consists of radiant heat for 30 minutes, deep stroking and kneading massage of the neck and upper back to relieve pain and muscle spasm, and exercises to strengthen muscles which elevate the shoulders and maintain good posture, particularly the erector spinae and rhomboids. Under conservative management it was found in two series of studies that 71 per cent of patients responded favorably in one and 70.9 per cent in the other.

Nonunion of Trochanteric and Subtrochanteric Fractures. H. B. Boyd, and S. W. Lipinski. Surg. Gynec. & Obst. **104**:463 (Apr.) 1957.

The authors discuss a series of 28 patients who developed the relatively rare complication of nonunion following fractures of the trochanteric and subtrochanteric regions of the hip. Nonunion for such fractures treated at the Campbell Clinic is between one and two per cent. Fifteen of the patients were male and 13 were female. The mean age of the group was 47 years, giving the impression that nonunion is more apt to occur in a younger age group. The authors feel that the two types of trochanteric fractures most prone to develop nonunion are those associated with a subtrochanteric fracture and those associated with a fracture of the base of the femoral neck. If absorption of the bone occurs at the fracture site, the nail tends to hold the fracture site apart. As nonunion develops the hip goes into a varus position causing the nail to break or bend — a result rather than a cause of nonunion.

In this series of 28 cases, 22 of the patients were operated upon for correction of their nonunion. The surgery usually consisted of removal of previous internal fixation apparatus, excision of scar tissue with freshening of bone ends, overcorrecting the hip into a valgus position, fixation with a Jewett nail, and finally packing of chips of bone about the fracture site. External support usually is not used postoperatively unless the surgeon is dubious of his internal fixation. In some cases the marked comminution of the trochanteric

region a "figure of eight" wire loop is used to secure fixation of the trochanteric region to the nail. The authors particularly emphasize the importance of placing the hip in valgus position since this produces an impacting force at the fracture site. Of the 22 patients who underwent surgery for correction of nonunion, 20 secured firm union after one operation; one patient had two operations and one patient required four procedures before a firm union was obtained.

An Evaluation of Sympathectomy in the Treatment of Peripheral Arterial Occlusive Disease and Reflex Sympathetic Dystrophy: Anatomic, Physiologic and Clinical Observations. D. F. Casten, and B. Freundlich. Bull. Hosp. Joint Dis. 17:251 (Oct.) 1956.

Accumulated experience related to anatomic and physiologic considerations has resulted in more rigid criteria for sympathectomy. Cortical and hypothalamic sympathetic centers have been demonstrated, and their existence substantiated by clinical observations. The pathways connecting these centers with the paravertebral sympathetic ganglia are described.

Innervation of the upper extremity is from the second to tenth thoracic sympathetic ganglia. However, to insure successful sympathectomy, the authors advocate removal of the stellate ganglion with the second, third and fourth ganglia, and any accessory ganglia.

Sympathetic innervation of the lower extremity proceeds through the anterior roots of the first, second and third lumbar sympathetic ganglia. Great variation exists in the lumbar area in the number of ganglia; in the rami, not all of which join the spinal nerves directly but may join the genito-femoral nerve; and in the presence of accessory ganglia with direct connections to the spinal nerves. Accessory chains may also be present in the adventitia of the aorta. Cross communication with the opposite side has been reported. Any of these variations may explain the persistence of sympathetic activity after sympathectomy. Removal of the chain from the eleventh thoracic to the fifth lumbar ganglia with wide dissection for accessory chains is advocated.

The purpose of sympathectomy is the abolition of the cerebral and spinal vasoconstrictive reflexes. This increases collateral circulation, decreases sweating and the consequent heat loss, and relieves pain of vascular origin. The two suggested indications for sympathectomy, occlusive vascular disease and reflex sympathetic dystrophy, depend upon these benefits. The physiologic basis for these effects is discussed in detail.

Factors which limit the effectiveness of sympathectomy include the anatomic variations, sensitization to circulating adrenalin, paradoxical gangrene, basal vascular tone intrinsic in the vascular tree, and regeneration and reorganization of the sympathetic chain. The results are prejudiced also by clinical limitations such as far advanced and progressive arteriosclerosis, and ischemic gangrene, the age of the patient, the presence of diabetes, or in sympathetic dystrophy, irreversible trophic changes and functional impairment.

Clinical indications rest upon the absence of ischemic necrosis with infection, definite evidence of a vasospastic element, progressive chronic arterial insufficiency with claudication, and ischemic neuritis without gangrene. The contraindications are primarily irreversible ischemic changes and extensive and rapidly progressive arterial occlusion. In sympathetic dystrophy, early treatment will abort the progress of the disease and prevent irreversible changes. The best prognosis is offered in patients with claudication in the absence of ischemic necrosis, and in patients with segmental occlusion. Ischemic gangrene is the greatest impediment to success.

Tendon Transplantation in Rehabilitation. W. T. Green. J.A.M.A. 163:1235 (Apr. 6) 1957.

Indications for transplantation include replacement of a lost muscle function through paralysis or for correcting an imbalance which interferes with stability and/or produces deformity. Transplantation must be considered in relation to the total function of the part and of the total function of the individual. Evaluation of muscles selected for transplantation must be carefully made. Selection should be guided by the muscle's strength before transplant, whether its original function is of less importance than it would be in its new position and whether the remaining musculature is strong enough to maintain balance of strength. Ideally, transplants accomplish the most when a muscle that is deforming is used and is transplanted to substitute for an essential weak one. Transplantations should not be done under the age of five unless there is a rapidly progressing deformity. Patient cooperation postoperatively is most desirable.

Multiple descriptions of technics of transplantation are described. Pitfalls of too cautious or too radical surgical maneuvers are considered. Straight line of pull is desired, a good gliding space and tunnel for the transplanted tendon are essential. Adequate tension and terminal attachment of the muscle is likewise important.

The success or failure of tendon transplantation depends to a large extent on postoperative management. Continued support in an overcorrected position is a primary rule. Many cases can begin active exercise of their tendon transplant five to seven days postoperatively. The patient is taught to contract the muscle as it was originally used, as the

patient gets the "feel" of the tendon, the part is assistively moved in the direction of its intended use. Initially the range of motion is small, then it gradually increases to a normal level. Resistive exercises are not allowed before six weeks postoperatively, and heavy, progressive resistive exercises avoided for at least three months postoperatively. Range of motion rather than power is the initial goal. Reeducation of the transplant into a new functional pattern must not be neglected. Although a muscle transplant may produce a good range of motion in isolated movement, it is of no value unless it performs a useful function. A patient may retain a foot-drop gait despite an anterior peroneal transplant unless the patient is instructed in the use of this tendon during gait. Assistive measures such as crutches, spring-leg braces, and bivalved night casts are important adjuncts in the development of function of the transplant.

The author concludes that a well-planned tendon transplant in the hands of a good technician, plus good patient cooperation and postoperative management will result in a very satisfying experience for the orthopedist and patient.

Histopathological Study of Acute Anterior Poliomyelitis: Lesions of the Peripheral and Central Sensory Systems. S. Nicolau; T. Hornetz; R. Dinu, and others. Minerva med. 48:2168 (June 20) 1957 (In Italian) [Turin, Italy].

The topography and the extension of the lesions in the sensory neurons of the spinal cord, in the peripheral segments (ganglions and nerves); the alterations of the general sensibility in the various regions of the encephalon, from the bulb to the thalamus and to the cerebral cortex; and the centers of unconscious proprioceptive sensibility in the cerebellum were studied in 52 patients with poliomyelitis and in four monkeys that had been infected with poliovirus. All patients presented lesions of the posterior horns; the lesions were more marked at the base of the horns (the region most close to the anterior horns) in half of the patients. Three patients had true lesions only in the posterior horns, while perivasculitis was observed in the anterior horn. Five of 14 patients with lesions in the sensory area presented massive softening of the posterior horns. Involvement of Clarke's column occurred in five patients. A study of the medulla by longitudinal serial sections in three patients revealed uninterrupted lesions.

Lesions of the spinal ganglions were always present. Cajal cells were found to participate very actively and from the very beginning in the neuronophagic process. Diffused infiltration with lymphocytes and monocytes and connective tissue hyperplasia were observed. Lesions of the roots were pronounced whenever the grey substance was markedly affected. Fairly intensive perivascular infiltrations were observed in some patients. One patient with extensive lesions of the roots presented a discontinuous and segmentary degeneration of the peripheral nerves. The study of the sensory encephalic connections in five patients revealed lesions of the bulb, of the protuberance, and of the peduncle as well as of the cerebellum and of the thalamus in three patients. The other two patients presented lesions that went beyond the bulb but did not have lesions of the neurons in the parietal region of the cerebral cortex. Observations in 20 patients showed that in seven patients the spinal ganglionic lesions were as intensive as the lesions of the corresponding posterior horn.

Nonneurological Lesions of Poliomyelitis in the Acute Phase. G. C. Angela, and F. Di Nola. Minerva med. 48:2149 (June 20) 1957 (In Italian) [Turin, Italy].

The authors report on a study of the anatomic and pathological nonneurological lesions present in a group of 198 patients with poliomyelitis in the acute phase. Fourteen patients died of bulbar poliomyelitis and one of intercurrent bronchopneumonia. Postmortem examination of the 15 patients revealed interstitial lesions and lesions of the bronchioles in four patients, bronchopneumonic lesions in one, mechanical obstructive phenomena in seven, and pulmonary edema in one. Pulmonary lesions were not present in the other two patients. Specific myocarditis due to poliovirus was not found. Examination of the heart showed signs that are frequently found in patients dying of other infectious diseases or of acute asphyxia. One patient presented mild hemorrhagic lesions in the gastric mucosa and in the terminal part of the ileum. Some patients presented skin lesions which were caused mainly by muscle dysfunction. Phenomena of hyperkeratosis and at times of acanthosis with contraction and rupture of the elastic fibers were noted in some patients; these lesions were more marked in the elderly patients. Significant osteoarticular lesions were not observed. The patients were dismissed as soon as they had recovered from the acute phase of the disease, whereas osteoarticular lesions occur at a later stage. Early atrophic phenomena combined with inflammatory infiltrates (lymphocytes and rarely plasmacytes) were observed in the muscular fasciculi at autopsy and at biopsy.

---

book reviews

The reviews here published have been prepared by competent authorities and do not necessarily represent the opinions of the American Congress of Physical Medicine and Rehabilitation and/or the American Academy of Physical Medicine and Rehabilitation.

PHYSICAL EXAMINATION IN HEALTH AND DISEASE. By *Rudolph H. Kampmeier*, M.D. Cloth. Price, $9.50. Pp. 774, with illustrations. F. A. Davis Company, Publishers, 1914 Cherry St., Philadelphia 3, 1957.

This book is intended as a textbook for second year medical students. Its general scheme is to discuss the physical findings in health and then compare these findings with those in disease.

Chapter 1 outlines the proper history taking using the standard identifying information, chief complaint, present illness, past history, personal history, social and environmental, as well as the family history. A topical outline ends the chapter.

Chapter 2, "The Body in Action" was written by Dr. William Orr, Professor of Neurology and Psychiatry, Vanderbilt University School of Medicine. This chapter, though short is an excellent summary of the physical findings in neurologic disease ranging from the peripheral nerve to the cortical lobes.

Chapters 3 and 4 deal with the general survey in health and disease respectively. The remaining chapters discuss the normal and abnormal findings starting with the head and including the neck, breast, chest, heart and blood vessels, the abdomen, genitalia, and end with the musculoskeletal system.

The book will be of value to the medical student as a text, and as a review to the intern and general practitioner. *(Harry T. Zankel, M.D.)*

CONTEMPORARY RHEUMATOLOGY. Proceedings of the Third European Rheumatology Congress. The Hague-Scheveringen, 1955. Edited by *J. Goslings*, and *H. van Swaay*. Cloth. Price, $15.00. Pp. 683, with illustrations. D. Van Nostrand Co., Inc., 120 Alexander St., Princeton, N. J., 1956.

This is not a textbook but rather a compilation of many of the papers read at the Third European Rheumatology Congress held in the Netherlands in 1955. Many of the papers are given in toto but many are summaries or condensations of the paper actually presented.

The first section is composed of papers on rheumatic fever; the second section is on the subject of connective tissue; the third section concerns disc degeneration and osteoarthritis of the spine; the fourth section is on rheumatism and social medicine, and the fifth section is composed of papers termed "free subjects." This covers all miscellaneous subjects not covered specifically in the previous four sections.

There are over 200 contributors to these papers. The papers presented in foreign languages have short summaries in English at the end of the presentation. Likewise all English contributions have summaries in French. The criticisms of the collection would be about the same as one would have who listens to all the papers presented at a scientific convention. There are conflicting views which are unresolved. Some of the papers are so condensed as to be meaningless. Other papers are presented which lack scientific controls and might be termed subjective ottervations.

Except for the generally accepted fact that rheumatic diseases are an important unsolved problem of medicine and that they have an impact on our socioeconomic world, there were few solutions to the problem in this book. As a bibliographic collection it is superb for the year 1955. *(Robert W. Boyle, M.D.)*

RHEUMATIC DISEASES, RHEUMATISM AND ARTHRITIS. By *Heinrich G. Brugsch*, M.D. Cloth. Price, $10.00. Pp. 330, with illustrations. J. B. Lippincott Co., E. Washington Sq., Philadelphia 5, 1957.

This is a particularly well-planned book giving clear-cut information with regard to the various forms of arthritis and allied conditions. The descriptions and the definitions of the various diseases are excellent and decisive. The allied conditions, or those that should be differentiated from the main forms of rheumatism, are concise and definite. Brugsch defines the information necessary to a good history which includes a careful study of the family, the social history and the emotional history. He notes the specific observations required for a good physical examination of the patient with arthritis, as well as a good general examination.

An excellent chapter is headed *Laboratory Procedures.* The author not only states what information is required with regard to the urine, blood and joint fluid, but how the tests can be made. Under *Therapy,* he discusses drugs, diet, physical medicine, orthopedic therapy and general measures, the latter including spa therapy, home therapy and rehabilitation. Under drug therapy the various hormones, antibiotics, vaccines, etc., are evaluated, as well as the usual drugs used in the various rheumatic diseases. Definite charts are included. Under *Diet,* good programs of diet are specifically outlined.

Chapters are given to rheumatic fever, rheumatoid arthritis, atypical forms of rheumatoid arthritis, which include Still's disease, Felty's syndrome, palindromic or recurrent rheumatism, psoriatic arthritis, spondylitis ankylopoietica, diffuse collagen diseases, degenerative arthritis, gout, infectious arthritis, allergic arthritis, which includes serum sickness, angioneurotic edema and intermittent hydrarthrosis. There is a chapter on symptomatic arthritis which includes neuropathic joint disease, blood dyscrasias, ochronosis and chemical arthritis. There is a chapter on joint tumor and malformations. Another chapter on diseases simulating rheumatic diseases includes non-articular rheumatism, bursitis, and neuritis. A chapter on diseases simulating rheumatic diseases includes ruptured intervertebral discs and various bone diseases. Each chapter has its own bibliography. This whole book is sound and practical. It would be hard to conceive of a book with such a difficult subject being written in a more satisfactory manner than this one. Whether one is particularly interested in arthritis, or whether one is looking for a sound book of reference, it should be on every medical book shelf. *(Frances Baker, M.D.)*

EXPERIMENTAL PSYCHOLOGY AND OTHER ESSAYS. By *I. Pavlov.* Cloth. Price, $7.50. Pp. 653. Philosophical Library, Inc., 15 E. 40th St., New York 16, 1957.

This reviewer still vividly recalls the fascination with which he first read, in his early teens, about Pavlov's experimental works. Now, about a third of a century later, the same feeling is experienced in perusing his writings even though we are in a position to survey these works more critically and from a different perspective.

In spite of the various criticisms of some of Pavlov's theories, few scientists will deny him the well deserved place among the very great in the history of medicine and physiology. Pavlov made himself an easy target for such criticism. He considered himself, first and foremost, a physiologist (of the materialist school) and could not tolerate an opinion which disputed in any way the basic role of the process of "conditioning" in animal behavior. It is said that at one time he imposed a fine upon those of his assistants who dared to suggest that such behavior could be explained on other grounds. Nevertheless, as pointed out by Masserman (in his book "Behavior and Neurosis") "To Pavlov's lasting credit be it rather acknowledged that his experimental observations — when divorced from their theoretical superstructure — have never been challenged . . ."

The volume "Experimental Psychology (and Psychopathology in Animals) and Other Essays" is a choice selection of Pavlov's basic writings. The introductory chapter entitled "Ivan Petrovich Pavlov and the Significance of His Works" by Kh. S. Koshtoyants is an illuminating evaluation of Pavlov's contribution to medical knowledge. The autobiography that follows is too brief but contains some interesting remarks on contemporary Russian educational institutions. Among the selected essays are such famous presentations as the Works on Digestion, which earned the author the Nobel prize in 1904, and the lectures on studies of Higher Nervous Activity where Pavlov first defined conditioned and unconditioned reflexes. Other chapters include discussion of the problems of sleep, hypnosis, and relationships between physiology and psychiatry and psychology.

An interesting part of the book contains a verbatim recording of the "Wednesday" gatherings during which Prof. Pavlov spared no epithets in his criticism of gestalt psychology and the idealistic concepts of Koehler and Sherrington. The volume also includes a comprehensive and informative section devoted to "Notes and Commentary." This should be of special service to the lay reader who may not be familiar with some of the medical terms used. The author presents his material in an easily readable conversational style which favorably compares with many of the "scientific" writings of our own era.

The research work described in this anthology represents a gigantic step in the evolution of experimental physiology, psychology, and the concepts of psychosomatic relationships. However, Pavlov repeatedly stressed that his biological experiments should be viewed primarily in their relationship to clinical manifestations and actual life experiences of adaptation. Again to quote Masserman ". . . toward the end of his life Pavlov himself, probably as a result of his interest in clinical psychiatry, began to supplement his concepts with more dynamic and holistic views of both animal and human behavior." Pavlov's works should be required reading for all those interested in biological sciences. *(Jack Meislin, M.D.)*

ALBERT SCHWEITZER. THE STORY OF HIS LIFE. By *Jean Pierhal.* Cloth. Price, $3.00. Pp. 160, with illustrations. Philosophical Library, Inc., 15 E. 40th St., New York 16, 1957.

This is the interesting story of a man whose mentality and temperament, cultural heritage and physical stamina have combined to fill his life with the most varied adventures. His accomplishments have been such as to make him a featured participant in academic festivals of the most exalted sort; his determination has been such that the humblest manual labor done side by side with African natives seemed the natural thing to do; his tolerance for human beings has been such that he continued medical and surgical aid to people too far sunk in apathy, ignorance, or superstition to observe elementary rules of cleanliness. All this activity seems to be the spontaneous expression of a personality that has had to let itself out somehow, whether in literature, in music, or in medicine, without the calculated advice of experts in public relations. Schweitzer in 1932 previsioned the "cottage of Philemon and Baucis going up in a thousand flames" and feared that "economic industrial circumstances would work out in the utter elimination of the substantial independence of the individual." In his own work, however, he has shown how rich can be the life of an individualist dedicated to altruism, and in this book an excellent biographer has shown, by a wealth of vivid detail, how simply it all came about. *(Frederic T. Jung, M.D.)*

ANNUAL REVIEW OF MEDICINE. Vol. 8. Edited by *David A. Rytand,* M.D., and *William Creger,* M.D. Cloth. Price, $7.00. Pp. 530. Annual Reviews, Inc., Grant Ave., Palo Alto, Calif., 1957.

This valuable book contains reviews of recent contributions on the use of adrenocortical hormones in infections; on biological and chemical means of prophylaxis against infectious disease; on diseases of the gastrointestinal tract, cardiovascular system, kidneys, nervous system, and respiratory system; on obstetrics, psychiatry, nutrition, endocrinology, pediatrics, allergy, and immunology; on certain aspects of the action of ether, alcohol, cyclopropane, barbiturates, opiates, and heparin; on the treatment of helminthic diseases, and on experimental retrolental fibroplasia. Notable for fresh viewpoints is a chapter on diseases of the blood and reticuloendothelial system, subtitled "The Red Cell and Some of its Problems." Of particular interest to physiatrists and biophysicists are three chapters on pneumoconiosis, silicosis, and the physics and chemistry of dust; on radioactive isotopes in medicine, and on connective tissue (collagen) diseases. The last is especially to be commended for judicious choice of details and compactness of presentation. The subject-indexes of annual reviews in other fields have sometimes been disappointingly poor, as if turned out by some word-handling machine without regard for the purposes a reader might have in using them. In the present instance the subject-index is good, and there is the usual faultless author-index. This volume is recommended. *(Frederic T. Jung, M.D.)*

MODERN THERAPY IN NEUROLOGY. By *Francis M. Forster,* M.D. Cloth. Price, $12.00. Pp. 792. The C. V. Mosby Company, 3207 Washington Blvd., St. Louis 3, 1957.

The management of patients with neurologic disease is a subject of importance for the general practitioner, the neurologist and the physiatrist. Most prior texts of neurology have been concerned primarily with the intricacies of diagnosis for little heretofore has been available for therapy either specific or symptomatic and physical medicine and rehabilitation have usually been neglected. This book then fills a definite need.

A glance at the table of contents reveals how comprehensive in its scope from involvement of the central nervous system to the cranial and peripheral nerves and the automonic system. Psychiatric diseases are not included.

Each chapter is written by a well-known specialist, but the manner of presentation is uniform and suitable for easy use as a reference. For the student there are ample references which are remarkably up-to-date, particularly at this time when so many new drugs are being recommended for treatment of the degenerative diseases of unknown etiology.

The role of physical therapy is briefly mentioned in the individual chapters. A special section, however, is directed to physical medicine and rehabilitation in neurology which should serve to point out to the neurologist or general practitioner what methods of treatment are available and worthwhile. The details of technic which would interest the physiatrist or physical therapist are not included.

This is an extremely useful reference book for everyday use and should be indispensable for the neurologist and physiatrist in training. *(Arthur L. Watkins, M.D.)*

PSYCHIATRY FOR THE FAMILY PHYSICIAN. By *C. Knight Aldrich,* M.D. Cloth. Price, $5.75. Pp. 276, with illustrations. McGraw-Hill Book Company, Inc., 330 W. 42nd St., New York 36, 1955.

This book is an introduction to psychodynamics in medical practice for the medical student or the practicing physician. The author frequently uses case histories of patients to show that the psychodynamic motiva-

tion, both unconscious and conscious, which has developed from the patient's genic endowment and his past environment are extremely important in the responses which he makes to the stresses of living. In addition to using case histories to demonstrate that the problems considered are common to the practice of a general physician other histories illustrate how the psychodynamic factors have been responsible for some of the apparently bizarre reactions of patients. A section is devoted to the emotional response to illness. A step-by-step outline of emotional growth and development is presented and the various problems seen by the general practitioner as the result of the interruption of emotional growth are discussed. Then the problems of psychopathology of delinquency, neurotic reactions, psychotic reactions and problems of marriage are considered as they would apply to general office practice. In the final chapters, diagnosis and treatment applicable to general clinical practice are presented. The book is oriented throughout toward the psychiatric problems of the general practitioner. For this reason it is useful as a medical text for students and physicians in practice. The sections on emotional growth and development and the psychopathological reactions are pertinent to the problems faced daily by the physiatrist working with handicapped patients in a rehabilitation setting. Psychodynamic theory helps in understanding the responses of the handicapped patient to his disability and to the rehabilitation program. *(Frederic J. Kottke, M.D.)*

AN INTRODUCTION TO ELECTROMYOGRAPHY. By *Fritz Buchthal*, M.D. Paper. Pp. 43. Gyldendals Presseafdeling, Box 11, Copenhagen K, Denmark, 1957.

This book makes no claim to cover the subject of electromyography in any comprehensive manner. It is what the title implies, an introduction to the subject. It represents basically in condensed form, the vast personal experiences of the author in connection with the neuromedical and neurosurgical services of the University Hospital in Copenhagen for the past fifteen years.

Dr. Buchthal has made numerous contributions to the literature of electromyography, especially with regard to average potential duration, average potential voltages, and percentage of potentials discharging synchronously with each other. Much of his discussion with respect to the normal as well as the abnormal electromyogram centers around these findings. These procedures are elaborate and time consuming. For example, determination of the mean duration requires recording from at least 20 different points within the same muscle, then analyzing numerous motor unit potentials in order to arrive at an average duration. The researcher will find this a useful tool. The clinician would find this impractical if not impossible.

No mention is made of the anatomical basis of electromyography in differentiating a central lesion from a peripheral one. Such differential diagnosis is accomplished for the most part by studies on degree of synchronicity and average voltage, another time-consuming technic. In peripheral nerve lesions, the percentage of synchronicity is relatively low, as in the normal, 20 per cent. In central lesions, the per cent of synchronicity is quite high.

The discussion is presented in logical sequence and includes physiological mechanisms, the normal electromyogram, electromyographic procedures, findings in neurogenic paresis, myogenic paresis, and finally electromyographic findings in disorders of neuromuscular transmission.

Dr. Buchthal's studies are unique and have added appreciably to our knowledge of electromyography. His "proposed reading" list at the end of his book, though far from being comprehensive, represents an excellent starting point for those interested in electromyography. The book is recommended for all beginners in electromyography. *(Arthur A. Rodriquez, M.D.)*

3rd International Congress of Physical Medicine

IIIe Congres international de Medecine Physique

3° Congreso international de Medicine Fisica

3. internationalen Kongress für Physikalische Medizin

Week of

August 21, 1960

WASHINGTON, D. C., U.S.A.

Preliminary information regarding this meeting may be had from the Office of the Secretary General: WALTER J. ZEITER, M.D., or from the EXECUTIVE SECRETARY, DOROTHEA C. AUGUSTIN, 30 North Michigan Avenue, Chicago 2, Illinois.

You are invited to make application to present

a scientific paper, exhibit or film — at the

36th Annual Session of the American Congress of Physical Medicine and Rehabilitation, Philadelphia, The Bellevue Stratford, August 24-29, 1958.

Please check one or any of the following. Upon receipt of this application form, the necessary information will be sent to you. The decision of the Program Committee for the 1958 session covering any portion of the meeting will be final.

☐ I wish to present a scientific paper; the tentative title is _____

_____

☐ I wish to present a scientific exhibit; the tentative title is _____

_____

☐ I wish to present a scientific film; the tentative title is _____

_____

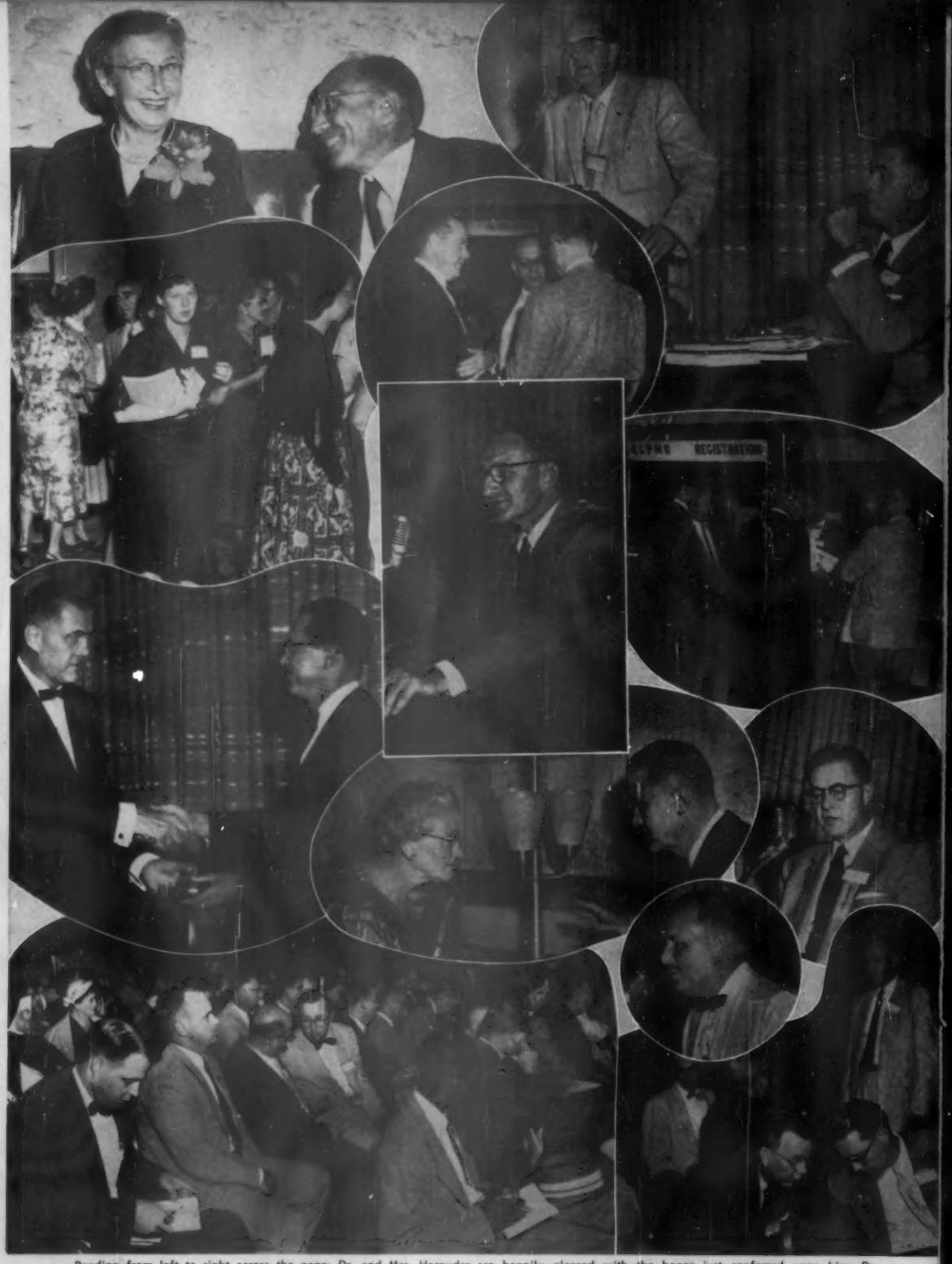
SIGNATURE _____ _____

(Please Print Your Name Here)

ADDRESS _____

(Please Print)

DATE _____



Reading from left to right across the page: Dr. and Mrs. Harpuder are happily pleased with the honor just conferred upon him; Dr. Knudson ponders carefully the report of Dr. Zeiter, the executive director; the session is over!; Drs. Wilson, Friedland and Northway in serious discussion; (inset) Dr. Bechtol, our guest, addresses the dinner group; the registration desk is where you meet old friends and make new ones; for a job very well done, Dr. Rose presents Dr. Knudson with the presidential gavel; Drs. Baker and Knudson review final plans for the dinner program; the plenary session opens with Dr. Knudson delivering his address; typical view of a scientific session; (inset) Dr. Nyquist welcomes us to California; something in the making?, Drs. Boyle, Shields, Smith and Rose chat while Dr. DeForest plans to join them.

Reading from left to right across the page: The newly elected Congress president and his lovely wife, Dr. and Mrs. Rose; we are hungry, much; a very handsome speaker's table, indeed!; ave for Dr. Rose and vele for Dr. Knudson; it isn't insurmountable, Drs. Carlson, Greene, Baker and Knudson tackle a weighty problem; Mrs. Wilson is having a wonderful time; Dr. Newman welcomes to office the newly elected Academy president, Dr. Wilson; Dr. Knudson and executary share the same thought — 30, 30, 30!

medical news

Members are invited to send to this office items of news of general interest, for example, those relating to society activities, new hospitals, education, etc. Programs should be received at least six weeks before date of meeting.

Principles of Rehabilitation

Course description: The interest shown by the President of the United States and Congress in this field is reflected in the recent legislation which makes it possible to utilize and implement the potential resources of our nation in order to achieve maximum benefits for the disabled. This course has been designed for persons who are concerned with rehabilitation. The course presents the basic concepts of rehabilitation in all its aspects. Principles and methods are presented through lectures, clinical demonstrations and group discussions. Other longer term courses leading to certification in specialized skills and technics are available in the School of Nursing, The Philadelphia School of Occupational Therapy and the Division of Physical Therapy of the University of Pennsylvania. Application or inquiry for these courses should be directed to the Dean or Director of the individual school concerned. The instructional staff will consist of representatives from the various divisions of the University of Pennsylvania, and guest lecturers.

Requirements: The course is open to physicians, registered nurses, occupational therapists, physical therapists, social workers, rehabilitation counselors, and others concerned with rehabilitation of the handicapped. Enrollment for each of the sessions will be limited.

Traineeship stipends: A limited number of trainee stipends to eligible persons attending the course may be available from the U. S. Office of Vocational Rehabilitation. Applications will be forwarded upon request.

Dates: February 3-7, 1958; April 7-11, 1958, and June 16-20, 1958 (reserved for physicians).

Hours: Classes are scheduled Monday through Friday, 9 a.m. to 5 p.m.

Fee: No tuition fee is charged. A registration fee of $10.00 in check or money order payable to the Trustees of the University of Pennsylvania is required 30 days prior to the opening date of the course selected.

Additional information: Address requests and inquiries to the Rehabilitation Center, Hospital of the University of Pennsylvania, Philadelphia 4, Pennsylvania.

Clinical Fellowships Available

The American Cancer Society has announced that clinical fellowships at the senior resident level for the academic year 1959-60 may be applied for by institutions accredited by the Council on Medical Education and Hospitals of the American Medical Association to give training in the following specialties and sub-specialties, with emphasis on the diagnosis and treatment of cancer: internal medicine, malignant diseases, neurological surgery, obstetrics-gynecology, orthopedic surgery, otolaryngology, pathology, public health, radiology, surgery and urology.

Institutions will be notified of awards granted in June 1958. Individual candidates should apply directly to an institution, or the American Cancer Society, for information concerning fellowships. The annual stipend, tax exempt, is $3,600.

Application forms are available from the Director of Professional Education, American Cancer Society, Inc., 521 W. 57th St., New York City 19. February 15, 1958 is the deadline for institutions submitting applications for the 1959-60 clinical fellowships.

TV and Blood Clots

Television viewers should get up and walk around at least once an hour, or they run the risk of getting serious leg disorders, Dr. Meyer Naide, Woman's Medical College of Pennsylvania, Philadelphia, reports in the *Journal of the American Medical Association.*

He reports three cases of dangerous blood clots which formed in the leg vessels of patients who had been sitting in awkward positions watching TV.

Tight garments should be removed before prolonged TV watching, and the viewer should move his legs frequently.

Twenty-one deaths are reported to have resulted from this type of circulatory disorder in England during World War II when air raid victims had to spend long periods of time sitting on chairs or benches in shelters. The blood clots which formed in the leg veins as a result of "long sitting" were carried up to the lungs and caused sudden death.

"Clinical Norms," Helpful Book, Available from Lakeside

Clinical Norms, a compact but comprehensive book useful in medical practice and in professional schools, is being made available by Lakeside Laboratories, Inc. on request from medical school deans and instructors of clinical nursing. In its 27 pages, the publication includes hundreds of facts used in evaluations of laboratory tests and clinical diagnoses of various conditions.

Lakeside points out that these data, difficult to keep in mind are also difficult to locate in the many textbooks that would otherwise be necessary. While the many established standards occasioned the preparation of Clinical Norms, the recorded values are subject to change as investigators develop new technics. Clinical Norms is periodically revised. In this edition, values for certain electrolytes are expressed in terms of milligrams per cent and as milliequivalents.

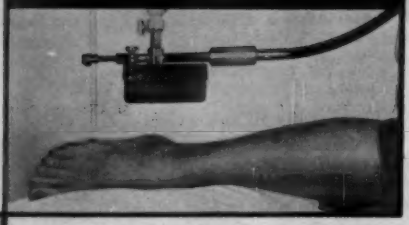
THE ADVANTAGES OF MICROWAVE DIATHERMY

BURDICK MW-1 MICROWAVE UNIT

The physiological effects of microwave diathermy are deep tissue heating (up to 106° F. two inches deep in muscle tissue) with increased blood flow.

In microwave diathermy radiations may be reflected, focused or directed to the exact area desired. The floating arm with spacer permits easy positioning of the director, to the treatment area — without skin contact. Single power control and automatic timer insure simple operation and time-saving convenience.

With the Burdick MW-1 Microwave you have the confidence of superb workmanship backed by a nationwide service organization. The Burdick Corporation is happy to supply you with further information on Microwave Diathermy, or to give you a free demonstration of the MW-1.



Application to an injured ankle

Arthritic hands being treated

An effective treatment for bursitis

The Burdick Syllabus, a bulletin on physical medicine, will be sent you regularly on request.

THE BURDICK CORPORATION
MILTON, WISCONSIN
Branch Offices:
New York • Chicago • Atlanta • Los Angeles
Dealers in all principal cities

Burdick®

Members

Standing Committees of the American Congress of Physical Medicine and Rehabilitation

1958

Advances in Education
Arthur S. Abramson, *Chairman*
Robert W. Boyle
Harriet E. Gillette
Harold N. Neu
Elias M. Throne

Awards for Scientific Exhibits
David M. Paul, *Chairman*
John H. Kuitert
David S. Rausten
Joseph B. Rogoff
Abraham Vinograd

Balneology and Health Resorts
Igho H. Kornblueh, *Chairman*
E. C. Christensen
Boris J. Paul
Edward P. Reese

Braces, Splints and Prostheses
Odon F. von Werssowetz, *Chairman*
Leonard F. Bender
William J. Erdman, II
Edward T. Haslam
W. Kenneth Lane
Frederick E. Vultee, Jr.
Jessie Wright

Chronically Ill and Aged
Joseph N. Schaeffer, *Chairman*
Joseph F. Dreier
Bruce B. Grynbaum
Max K. Newman
Samuel Sherman
Earl J. Wylie
Frederick Ziman

Constitution and By-Laws
Richard T. Smith, *Chairman*
Earl C. Elkins
John H. Kuitert

Cooperation with Air Force, Army, Navy, Public Health and Veterans Administration
W. Harvey Moore
Anton A. Tratar
A.B.C. Knudson, *Ex-officio*

Cooperation with Food and Drug Administration
Joseph B. Rogoff, *Chairman*
Thomas P. Anderson
Donald J. Erickson
Rex O. McMorris
Fred B. Moor
James W. Rae, Jr.
David Rubin
Frederick J. Sheffield
George C. Twombly, Jr.

Correlation of Physical Medicine and Psychiatry
Daniel Dancik, *Chairman*
Allen W. Byrnes
C. DeWitt Dawson
Lucile M. Eising
Anita M. Isaac
H. Frazer Parry
William C. Schaefer

Essay Award
(ACPM&R Annual Essay Award and Bernard M. Baruch Essay Award)
George D. Williams, *Chairman*
Fritz Friedland
Frederic T. Jung
Israel Muss
Abraham Vinograd

Ethics
Harold B. Luscombe, *Chairman*
Louis P. Britt
Maxwell D. Flank
George H. Koepke
Robert M. Krout

Finance
Sedgwick Mead
Louis B. Newman
Herbert W. Park
Frank H. Krusen, *Ex-officio*

Foster, Encourage and Coordinate Research Projects
Joseph Goodgold, *Chairman*
David I. Abramson
Harvey E. Billig, Jr.
Ralph E. DeForest
Bror S. Troedsson

Gold Key Award
Frederic J. Kottke, *Chairman*
Donald A. Covalt
Donald J. Erickson
Louis B. Newman
Jerome S. Tobis

Implementation of Departments of Physical Medicine and Rehabilitation in Medical Schools
E. C. Christensen, *Chairman*
Arthur S. Abramson
Gregory Bard
Justus F. Lehmann

Legislation
Glenn Gullickson, Jr., *Chairman*
Earl C. Elkins
William C. Fleming
Bruce B. Grynbaum
Alfons J. Muller
Raoul C. Psaki
Dorothea C. Augustin, *Ex-officio*
F. Manley Brist, *Ex-officio*

Medical Auxiliary Services Related to Physical Medicine and Rehabilitation
Herbert W. Park, *Chairman*
Nadene Coyne
Emily R. Hess
Robert M. Krout
Louis B. Newman

Medical Economics
Leonard J. Yamshon, *Chairman*
Bertram M. Bernstein
Joseph E. Cox
S. Malvern Dorinson
Edward M. Krusen
William J. La Joie
Joseph Martella
Robert V. Miller, Jr.
Arthur A. Rodriquez
Frederick J. Sheffield
Bror S. Troedsson

Meeting Place
Walter J. Zeiter, *Chairman*
Morton Hoberman
Torsten H. Lundstrom
Eugene W. Peters
Howard F. Polley
Dorothea C. Augustin, *Ex-officio*

Membership
Otto Eisert, *Chairman*
Hilda B. Case
Carrie E. Chapman
Robert F. Dow
Elmer J. Elias
Gustave Gingras
Sherburne W. Heath, Jr.
Herbert Kent
Torsten H. Lundstrom
Richard R. Owen

Memorials and Lectureships
Frederic T. Jung, *Chairman*
Jerome S. Tobis
Walter J. Treanor

Nominating
A.B.C. Knudson, *Chairman*
Donald A. Covalt
Harriet E. Gillette
Gordon M. Martin
Fred B. Moor

Private Practice
David Siegel, *Chairman*
Lee B. Greene
Joseph L. Koczur
Samuel A. Schuyler

Program
Glenn Gullickson, Jr., *Chairman*
Leonard F. Bender
Harvey E. Billig, Jr.
Everill W. Fowlks
Morton Hoberman
Harold Lefkoe
Milton Lowenthal
Walter J. Zeiter
Dorothea C. Augustin, *Ex-officio*

Public Relations
Ralph E. Worden, *Chairman*
Harold Dinken
Charles D. Shields

Rehabilitation Centers
Edward B. Shires, *Chairman*
Herman J. Flax
Gustave Gingras
O. Leonard Huddleston
Keith C. Keeler
Kenneth S. Landauer
Rex O. McMorris
Harry W. Mims
Herbert W. Park
H. Frazier Parry
Juan Jose Quezada
Odon F. von Werssowetz
Ralph E. Worden

Announcing . . .

The Essay Award

sponsored by the

AMERICAN CONGRESS OF PHYSICAL MEDICINE AND REHABILITATION

To stimulate interest in the field of physical medicine and rehabilitation, the American Congress of Physical Medicine and Rehabilitation will award annually, a prize for an essay on any subject relating to physical medicine and rehabilitation. The contest, while open to anyone, is primarily directed to interns, residents, graduate students in the pre-clinical sciences and graduate students in physical medicine and rehabilitation. The Essay Award Committee suggests that members of the American Congress and American Academy of Physical Medicine and Rehabilitation bring this announcement to the attention of interested persons. The following rules and regulations apply to the contest:

1. Any subject of interest or pertaining to the field of physical medicine and rehabilitation may be submitted.

2. Manuscripts **must be** in the office of the American Congress of Physical Medicine and Rehabilitation, 30 N. Michigan Ave., Chicago 2, not later than June 2, 1958.

3. Contributions will be accepted from interns, residents, graduate students in the pre-clinical sciences, and graduate students in physical medicine and rehabilitation.

4. The essay must not have been published previously.

5. The American Congress of Physical Medicine and Rehabilitation shall have the exclusive right to publish the winning essay in its official journal, the ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION.

6. Manuscripts must not exceed 3000 words (exclusive of headings, references, legends for cuts, tables, etc.), and the number of words should be stated on the title page. An original and one carbon copy of the manuscript must be submitted.

7. The winner shall receive a cash award of $200.

8. The winner shall be determined by the Essay Award Committee composed of four members of the American Congress of Physical Medicine and Rehabilitation.

9. All manuscripts will be returned as soon as possible after the name of the winner is announced.

10. The American Congress of Physical Medicine and Rehabilitation reserves the right to make no award if, in the judgment of the Essay Award Committee, no contribution is acceptable. Announcement of the winner will be made at the annual meeting.

BERNARD M. BARUCH ESSAY AWARD . . .

Sponsored by the

AMERICAN CONGRESS of PHYSICAL MEDICINE AND REHABILITATION

An annual award of $100 will be given as a prize for an essay on any subject relating to physical medicine and rehabilitation. The following rules and regulations apply:

1. Any subject of interest or pertaining to the field of physical medicine and rehabilitation may be submitted.

2. Manuscripts **must be** in the office of the American Congress of Physical Medicine and Rehabilitation, 30 N. Michigan Ave., Chicago 2, not later than June 2, 1958.

3. *Contributions will be accepted from medical students only.*

4. The American Congress of Physical Medicine and Rehabilitation shall have the exclusive right to publish the winning essay in its official journal, the *Archives of Physical Medicine and Rehabilitation.*

5. Manuscripts must not exceed 3000 words (exclusive of headings, references, legends for cuts, tables, etc.), and the number of words should be stated on the title page. An original and one carbon copy of the manuscript must be submitted.

6. The essay must not have been published previously.

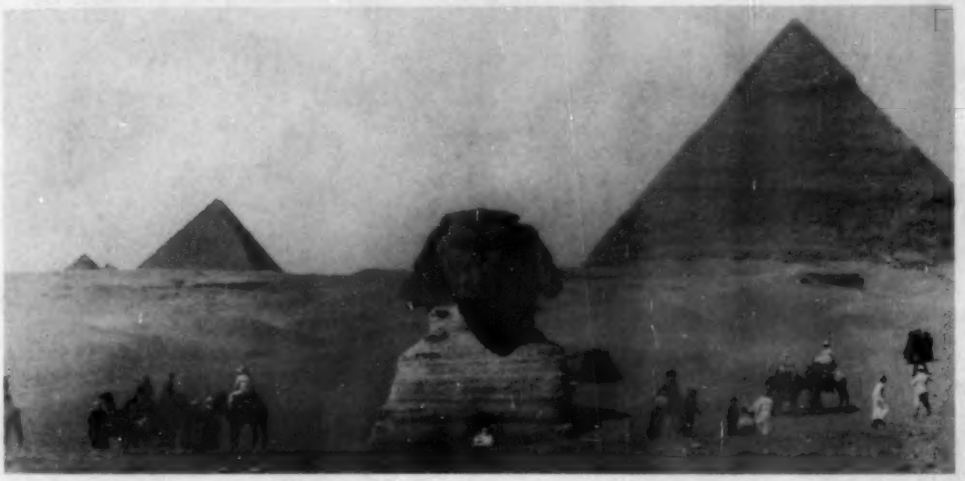
7. The winner shall receive a cash award of $100.

8. The winner shall be determined by the Essay Award Committee composed of four members of the American Congress of Physical Medicine and Rehabilitation.

9. All manuscripts will be returned as soon as possible after the name of the winner is announced. The winning manuscript becomes the exclusive property of the American Congress of Physical Medicine and Rehabilitation.

10. The American Congress of Physical Medicine and Rehabilitation reserves the right to make no award if, in the judgment of the Essay Award Committee, no contribution is acceptable. Announcement of the winner will be made at the annual meeting.

THIS (!?) is an Advertisement?



Since I have never been to Egypt I haven't seen the pyramids, but just what kind of an ass would you take me for if I denied their existence after the reports of thousands of competent observers and photographic evidence?

Come to think of it, I have never seen a germ or a virus, nor Sputnik I and II, nor do I know that the moon is not made of green cheese as my father used to tell us moppets.

I've heard the curt "I don't believe in Ultrasonics" from a surprising number of Therapists, Physiatrists, Internists, 'Orthopods' (in particular), Specialists of all ilk, and GP's. This would suggest that the authors of over 3,000 published papers and 20,000 medical men who are happily using Ultrasonics every day are: (1) Sloppy observers, (2) Dishonest, (3) Extreme enthusiasts, (4) Ax grinders, (5) Conclusion jumpers, (6) Sheep, (7) Run-of-the-mill quacks; and those who make Ultrasonic machines are: (1) Opportunists, (2) Money grabbers, (3) Cheats, (4) Money grabbers, (5) Pseudo-science promoters, (6) Money grabbers, (7) Exploiters of health rackets, (8) Money grabbers, (9) Part-time peddlers of second-hand autos, (10) Money grabbers.

Oh, well — a lot of people don't believe in doctors either . . . that is, until something hurts.

Cordially,

Carl Birtcher

C. J. BIRTCHER, *President*
The Birtcher Corporation

P.S. (1) Did you see the article on Ultrasonics in the October issue of the British Journal of Physical Medicine and also the editorial? I'll mail you a copy if you wish.

P.S. (2) Do you have a Birtcher Spot Quartz Lamp? One Physiatrist, chief of a large physical therapy department in a sizable hospital, said to me, "We have about $50,000 worth of equipment here, but we use this handy lamp more than any of it." If you want a bundle of printed matter, about the Spot Quartz ask for it. Please address all communications to Department C.J.B. *(that's me).*

Birtcher

HONEST VALUE . . . SINCERELY PRESENTED

4371 Valley Boulevard, Los Angeles 32, California